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ABSTRACT

Prepared by specialists on the evaluation team at the Syracuse University Center for the Development of Blind Children, the book describes the procedures of the special diagnostic clinic within this unit. The diagnostic clinic was established to provide a unified approach to the evaluation and study of multiply handicapped children. Described in detail are the various evaluation and examination techniques and procedures developed by the various disciplines participating in the program. Chapters deal with the general characteristics of deaf-blind children (Elizabeth Wagner), administration (Edward T. Donlon), psychoeducational evaluation (Edward T. Donlon), speech and language evaluation (Scott Curtis), casework evaluation (Vernon Wolston), pediatric examination (Miriam Swift), audiolcgical examination (E. Harris Nober), opthalmological examination (Joseph Frank), neurological evaluation (A. William Wright), and methods of education (Annette B. Dinsmore). (KW)

DEAF-BLIND CHILDREN

A program for evaluating their multiple handicaps.

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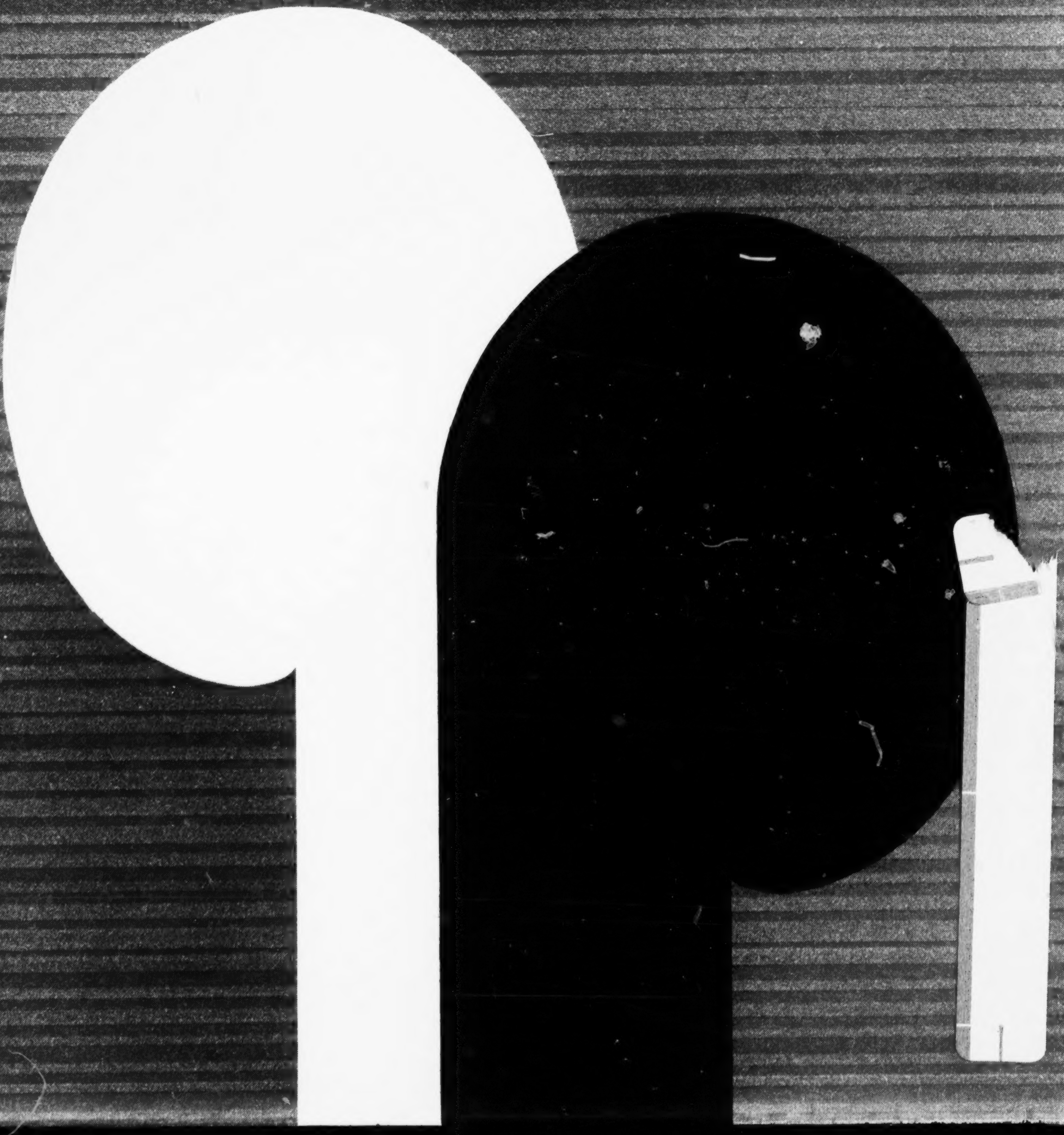

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AMERICAN FOUNDATION FOR THE BLIND

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Deaf Blind Children: Evaluating Their Multiple Handicaps

Scott Curtis, Edward T. Donlon, Elizabeth Wagner, editors

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American Foundation for the Blind
15 West 16th Street, New York, New York 10011

1970

FOREWORD

In 1957, the Syracuse University Center for the Development of Blind Children established a special diagnostic clinic in order to develop and provide an organized approach to the evaluation and study of multiply handicapped children. Since it had long had an active interest in the particular problems of deaf-blind persons and was concerned about the paucity of services available to this group, the American Foundation for the Blind offered to screen and refer children believed to be both blind and deaf to the clinic for evaluation. The Foundation also committed itself to underwriting the clinic fees and travel expenses for the children, their parents, and a social worker or other professional person from the family's community.

DEAF-BLIND CHILDREN: Evaluating Their Multiple Handicaps, which describes in detail the evaluation and examination techniques and procedures developed by the various disciplines that participated in the clinic's program, has been written in the hope that it will be of use to other persons and programs concerned with deaf-blind children. And the Foundation is particularly pleased that it is able to publish this book just at the time that the long awaited federally-supported National Center for Deaf-Blind Children and Adults has become a reality.

M. Robert Barnett
Executive Director
American Foundation for the Blind

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CONTRIBUTORS

Scott Curtis, Ph.D., Chairman, Speeth Pathology & Audiology, University of Georgia, Athens, Georgia, *formerly* Administrator, Speech Pathology Program, Syracuse, New York

Annette Dinsmore, Specialist, Services for the Deaf Blind, American Foundation for the Blind, New York, New York

Edward T. Donlon, Ed.D., Administrator, Center for Development of Blind Children, Syracuse University, Syracuse, New York

Joseph Frank, M.D., Ophthalmologist, Associate Professor of Medicine, Department of Ophthalmology, State University of New York College of Medicine, Syracuse, New York

E. Harris Nober, Ph.D., Chairman, Department of Speech Pathology, University of Massachusetts, Amherst, Massachusetts, *formerly* Administrator of Audiology Programs, Syracuse University, Syracuse, New York

Miriam Swift, M.D., Pediatrician, County (New York) Board of Health, Onandaga, New York

Elizabeth Wagner, OTR, Consultant, Rubella Birth Defect Evaluation Project, New York University Medical Center, *formerly* Specialist, Services for Deaf Blind Children, American Foundation for the Blind, New York, New York

Vernon Wolston, ACSW, Associate Director, Cortland County Mental Health Clinic, Cortland, New York, *formerly* Associate Director, Chenango County Mental Health Clinic

A. William Wright, M.D., Neurologist, *formerly* Assistant Professor, Department of Neurology, State University of New York College of Medicine, Syracuse, New York

INTRODUCTION

THE AMERICAN FOUNDATION FOR THE BLIND

The American Foundation for the Blind was incorporated in 1921 to cooperate with other agencies "in promoting all and every interest of the blind and the partially blind in America and to initiate movements for such purpose." Through the years the Foundation has broadened its scope and has progressed from a base of cooperation with other agencies to providing coordination as well as leadership in the field.

The Foundation's original by-law called for the establishment and staffing of bureaus of information, research, and education. Among the stated purposes of the Bureau of Information and Publicity was the responsibility to ". . . assemble, systematize and disseminate all available data in any way relating to. . . the deaf-blind." The Bureau of Research was authorized to "ascertain, develop and standardize. . . the best means of providing educational and other opportunities for the deaf-blind." Recognizing the needs of deaf-blind persons at its inception, the Foundation included this special group of severely handicapped people within its realm of responsibility right from the start.

FIRST WORLD CONFERENCE ON WORK FOR THE BLIND

The first World Conference on Work for the Blind was planned and directed by the Foundation, and took place in New York City in April 1931. This meeting was attended by delegates from 46 countries. A Round Table on education of deaf-blind children was included in the program and summarized in the report. Although comprehensive evaluation was not mentioned in the summary, the need for some form of evaluation was implied, since three categories of deaf-blind children were differentiated, and several different types of education were described. Looking back to this conference, it is interesting to note that 37 years ago the number of deaf-blind children being educated at any one time apparently ranged from one to six. Today we know of several hundred of these children in the United States alone who are receiving some type of training or education, including over a hundred enrolled in special departments for the deaf-blind. However, the recorder's comment that "such education is expensive" is as true now as when it was made in the 1930's.

ROCHELEAU-MACK SURVEY

The year before the World Conference (1930), the Volta Bureau had published *Those in the Dark Silence* by Rocheleau and Mack. This was written after a survey of the deaf-blind in Canada and the United States, undertaken to discover their number, their condition, and their requirements. A discussion of the characteristics and needs of deaf-blind children and adults was presented, and also a Biography Section or register in which all the deaf-blind individuals were entered whom the writers had "unearthed" during three years of "painstaking and thorough research." Of these, 63 were specified as children.

The writers were able to ascertain hardly more than the name and address of some of those listed, but they gathered a good deal of information about others. Where it was known, the biographical sketches by Miss Mack included: state of residence, date of birth, cause, type, and degree of impairments, age of onset of sensory losses, educational and vocational history, current status of schooling or employment, type of communication used, and in a few cases, rather extensive additional pertinent facts. Photographs of a number of well-known deaf-blind men and women and children illustrated the book.

The Mack register contained 665 names, but the authors felt that the actual number of deaf-blind people was "problematical," and that there should "probably be two or three thousand cases at least." Some of the difficulties they met with in their efforts to assemble the list were due to the fact that the records they had access to were not compiled in such a manner as to show any *combinations* of impairments, and that in many places laws were written so as to prohibit public agencies from releasing personal information which ironically was needed mainly to provide valid statistics for intelligent planning of services for their clients. These same roadblocks are often still encountered today when trying to put together comprehensive information relative to any kind of multiply handicapped person.

This register, compiled voluntarily and with much hard work on the part of Rebecca Mack, and with empathy for the individuals it described, was later donated to the American Foundation for the Blind, and became the nucleus for the current registers of deaf-blind children and adults maintained by that agency.

THE AMERICAN FOUNDATION FOR THE BLIND DEAF-BLIND REGISTER

Using this register as a basis for further research, the Foundation in 1945 assigned Dr. P. C. Potts, a staff member, to make another deaf-blind survey; this time in the United States only. The following year, after the Helen Keller Committee on the Deaf-Blind had been established by the Foundation, extensive work for both children and adults got under way on a *national scale* when a department of services for the deaf-blind was inaugurated and staffed. Since that time, the Foundation has carried out a broad spectrum of services for both deaf-blind children and adults under its own auspices, and has also stimulated and assisted other agencies to undertake programs on their behalf.

The Foundation's deaf-blind register at first listed both adults and children. It soon became apparent, however, that the characteristics of the deaf-blind adults were in the main quite different from those of the children. Furthermore, the *needs* of the two groups were not the same. The majority of the adults, one or both of whose impairments were adventitious, required a design for living or selective placement in employment. Education, preceded by developmental programs leading to readiness for education, were the essentials for a large proportion of the children. Much of the information solicited in order to help the adults did not give an accurate picture of a child, whose place on the developmental ladder was what counted. For this reason, the register came to be kept separately.

The adult register is maintained in two sections, one showing those blind persons who are severely hard-of-hearing and the other showing those who are blind and deaf. The children's register makes no such distinction. Since it is often impossible to assess a small child's vision and hearing acuity accurately without a prolonged period of observation, the children's register has been set up to include all children from birth to 20 years of age who have a combined vision and hearing impairment to a degree that it interferes with normal channels for learning.

In 1954, another campaign was launched by the American Foundation for the Blind to locate all deaf-blind children in the United States under 20 years of age. Some 3000 selected governmental and voluntary health, education, and welfare agencies were surveyed, and 64 new cases were added to the children's register, making a total of 229. At this writing, the children's register contains information on approximately 700 children, more than Rebecca Mack's entire register, but probably not half the children who have this combination of impairments and who should be registered. The increase in figures is due to several factors. The population explosion has brought with it more children and therefore more children who have impaired vision and hearing. The neonatal death rate has been lowered. Interest in the multiply handicapped child has expanded recently, and many more schools and agencies comprehend which children should be considered deaf-blind. The alarming number of babies with congenital cataracts combined with a hearing loss from the recent rubella epidemics has added many children to the lower age brackets. Furthermore, the value of the register is more clearly understood, and those who are responsible for planning services, and who need the statistics it provides, are more ready to encourage referrals to the register.

Referral procedures have not changed materially since the early days of the program. Requests for evaluation are usually initiated by a school or case-work agency, but sometimes they come directly from a child's parents or from a physician. If the latter is the case, the starting point is to locate a suitable agency to work with the child's family. The Foundation, being a national organization, does not provide services directly to individuals; instead it works through appropriate state or local agencies serving the blind. When the child's family does not know how to go about it, the Foundation will assist them to find such an agency responsible for blind children. Contact is then established between the Foundation and the school or agency, which must assign a professional person, who may be either a teacher or caseworker, to help the child's family.

NEED FOR AN EVALUATION PROGRAM

Since 1946, in addition to maintaining the register, the Foundation has provided consultation to the families of deaf-blind children, and referral to one or more services. It has also conducted a program of public education concerning the needs and the potential of this segment of the handicapped, and published articles and pamphlets for parents, professional workers and teachers, as well as recruitment material for all levels of employment in work for the deaf-blind child. The Foundation's leadership function, its success in stimulating the development of new departments for the education of deaf-blind children, and its pioneer attempts to provide teacher training are discussed later in this book.

In its efforts to "ascertain, develop and standardize" the best means of providing educational opportunities for deaf-blind children, the Foundation was in contact with a large number of parents of children believed to be both deaf and blind, and with numerous professional people who had deaf-blind children enrolled in their schools or carried in their case loads. Many of the parents were worried because their children were not developing normally, while the educators were concerned because some of their pupils had reached a plateau or a crossroads in learning, and there was indecision about where they should go next. The staff of the deaf-blind department at the Foundation soon realized that more than one type of educational opportunity was needed, that an educational plan must be made on an individual basis for each child, and that only through a comprehensive evaluation of the child could such a plan be developed. In the early 1950's, although some categorical diagnostic services existed, no comprehensive evaluation was available. For this reason, to their existing services of consultation, referral, parent counseling and professional education, the Foundation undertook to add still another service--comprehensive evaluation.

THE SYRACUSE UNIVERSITY CENTER FOR THE DEVELOPMENT OF BLIND CHILDREN

The Center for the Development of Blind Children at Syracuse University was established with the assistance of the Junior League of Syracuse to serve blind children from the county where it is located. Gradually, geographic limits were eliminated, and children were accepted from a wider area. In February 1957, a diagnostic clinic was included within this unit to provide a unified approach to the observation and study of multiply handicapped children. That same year, the American Foundation for the Blind offered its services to this evaluation clinic for the screening and referral of children believed to be deaf as well as blind. When funds were not otherwise available, the Foundation also arranged to underwrite clinic fees and travel expenses for the children, their parents, and a selected worker.

This book has been prepared by the Specialists on the Syracuse Evaluation Team to describe their procedure for other such centers which may eventually enter this service.

GENERAL CHARACTERISTICS OF DEAF-BLIND CHILDREN

Elizabeth Wagner

Between October 1957 and May 1966, 75 "deaf-blind" children were brought for evaluation to the Center for Development of Blind Children at Syracuse University, under the sponsorship of the American Foundation for the Blind, in order to have recommendations developed for an educational program. The following section presents some of the general characteristics of this group as taken from case reports.

While it might have seemed logical to describe the characteristics of the rubella children, the retrolental children, the retinitis pigmentosa children, and other diagnostic groupings, the disparities within these groups were almost as great as those from one such group to the next. Therefore, the focus is on a population of children who, in spite of many differences, had one thing in common: they were believed to have a combined vision and hearing impairment.

AGE, SEX, AND HOME STATE

Deaf-blind children are to be found in all parts of the United States with some variation in frequency due to epidemiological and demographic factors. The first 75 children seen in Syracuse came from 21 states, with New York represented by the most (14) and 7 states each represented by one child. The states the children were living in at the time of evaluation are shown in Table I. Whether the child was still living in the state where he had been born was not always specified in the reports.

There were 36 boys and 39 girls. The youngest child was less than two years old, the oldest 21. The median age of the children was six years, two months, with more children in the lower age brackets than in the upper. The six children who returned for re-evaluation appear twice in the figures in Table II.

AGE OF ONSET

In some instances the age of onset of the sensory impairment was impossible to determine. In others, the presence of hereditary factors underlying the damage to vision following an acute illness, unreliable reporting concerning acquisition of speech, multiple disorders of vision, and loss of hearing taking place over a prolonged period, were among the findings that made

TABLE I

State of Residence at Time of Evaluation for Deaf-Blind Children

State	Number of Children	State	Number of Children
Colorado	1	New York	14
Florida	3	North Dakota	3
Georgia	5	Ohio	2
Illinois	8	Oklahoma	1
Kentucky	3	Pennsylvania	8
Louisiana	9	South Dakota	1
Michigan	2	Tennessee	1
Mississippi	1	Texas	2
Missouri	2	Washington	1
New Hampshire	1	West Virginia	1
New Jersey	6	TOTAL 21 states 75 children	

TABLE II

Age of Evaluation of 81 Deaf-Blind Children

Age of Children	Number of Children
1'0" - 1'11"	1
2'0" - 2'11"	5
3'0" - 3'11"	9
4'0" - 4'11"	10*
5'0" - 5'11"	9
6'0" - 6'11"	5*
7'0" - 7'11"	12*
8'0" - 8'11"	5*
9'0" - 9'11"	8*
10'0" -10'11"	1
11'0" -11'11"	2
12'0" -12'11"	4
13'0" -13'11"	3
14'0" -14'11"	3
15'0" -15'11"	0
16'0" -16'11"	0
17'0" -17'11"	1
18'0" -18'11"	1*
19'0" -19'11"	1
20'0" -20'11"	0
21'0" -21'11"	1
TOTAL	81

*Seventy-five evaluations plus 6 re-evaluations valid conclusions very difficult to reach regarding the time when functional loss of vision and hearing occurred. Where the age of onset was known, it varied considerably. A small proportion of the children were reported to have been normal at birth, and to have suffered an injury or a disease which caused blindness and deafness at a specified time. Several were born either deaf or blind and the second impairment occurred progressively, later. The majority of the children were born with congenital defects of vision and hearing, or had disorders which developed in the first few weeks or months of life.

SOURCE OF THE MATERIAL REPORTED

In assembling the descriptive material given below, a study was made (though not in depth) of the reports from the evaluations of the first 75 children seen in the Syracuse program. Where these are incomplete, additional reports have been consulted, which were provided for the case records by the agencies referring the children. In a few instances, subjective observation and analysis have had to replace objective records.

THE CHILD AND HIS FAMILY

All socio-economic levels were represented in the series, and the family composition differed widely. Many of the children came from warm, intelligent families, who helped them make the most of their abilities by providing a suitable atmosphere at home, and appropriate referral to professional specialists. Regardless of their scholastic attainment or financial status such parents were of great assistance to the evaluators by giving reliable histories, and information based on accurate observation.

On the other hand, many of these multiply handicapped children came from multiply handicapped families, again irrespective of educational or economic level. Illegitimacy, rejection or abandonment by one or both parents, over-protection, and a symbiotic relationship between parent and child were some of the vicissitudes which created problems for the children concerned, in addition to those inherent in their sensory handicaps. A number of the children found substitute parents in the homes of relatives or in foster placement, so a surrogate family gave them the attention and security they lacked from their natural parents. Where this situation prevailed, however, it often created difficulties in the evaluation, since these people did not have first hand information about the conditions under which the child was born, nor could they describe his early development.

To evaluate these multiply handicapped children, the members of the team need to be both specialists and generalists, in order to recognize unusual and atypical conditions in their own field of specialization, plus many other unrelated abnormal conditions. Furthermore, in a program like this one, of national scope, where children come from all parts of the country, from families in different walks of life, the team members must have an extraordinary amount of skill in drawing out and evaluating information from people whose cultural patterns and modes of expression may be entirely foreign to them.

VISION

The ophthalmologist saw almost all the children in the series. Some of them were able to give reliable subjective responses to the eye tests, but the majority were not. The neurologist included a study of the children's eyes when he examined them, and the pediatrician observed their functional vision and reported her opinion. All the team members were alert to signs of vision and the use of it in each case where the child was believed to have any sight whatsoever, and they were all proficient in analyzing functional behavior in the visual realm.

According to the 1966 revision of the NSPB Standard Classification of Causes of Severe Vision Impairment and Blindness, the underlying etiology for severe vision impairment and blindness has been classified as: infection, injury, poisoning, neoplasm, general disease, prenatal influence.

All of these categories were represented among the children studied. In a few cases, where histories were incomplete or conflicting, etiology could not be established satisfactorily on examination, and in a very small group the etiology was unknown to science. In several cases, where the children were believed to be severely mentally defective, the diagnosis was reported as cortical blindness and the etiology for the mental defect was not stated in the eye report.

The largest number of cases was due to infectious diseases in the mother, mainly rubella, but also Asian flu and toxoplasmosis. Various infectious diseases in the children themselves, such as meningitis, tubercular meningitis, and encephalitis, were the cause of loss of vision in a few instances. Subdural dematoma occurred in one child at the age of six months. The second largest group was due to oxygen poisoning, with almost a third of the children having retrolental fibroplasia, most of them in the advanced stage. Several children had suffered severe injury to the head or to the eye itself. Prenatal influence not only affected those children whose mothers had had certain infectious diseases, but resulted in diseases and disorders of hereditary origin or in congenital anomolies. These included glaucoma, retinitis pigmentosa, anophthalmos, and bilateral coloboma of the iris.

Approximately two thirds of the children who were born with cataracts had undergone surgery of one or both eyes. Varying degrees of success were reported, some of them excellent. Other operations recorded in the histories were iridectomy and enucleation. Cataract lenses were worn with satisfaction by some of the aphakic children, while others did not like them, or refused to wear them, even where vision was presumed to be improved by their use. A recommendation was made to try plastic lenses, which are lighter than glass, in some of these latter cases.

Nystagmus was noted in over half of the children, strabismus in roughly a quarter, and microphthalmos in another quarter. Twelve were reported to have no vision, and 14 to have light perception only, and in some cases this was questionable. The remaining children were described by the ophthalmologist as having varying degrees of acuity, or by other members of the team in such terms as: some useful vision; can see across the room; useful vision but very myopic; can see large objects and movements; vision is adequate for mobility and locating objects.

At least one child accepted for evaluation was considered on examination not to have a visual problem, since with correction the acuity in the better eye was ascertained to be 20/20.

Concomitant conditions affecting the eyes or the vision occurred in a number of the children, and included: photophobia, distortion of visual perception, mild bilateral facial weakness, which in at least one case made fitting of a prosthesis extremely difficult.

HEARING, SPEECH AND LANGUAGE SKILLS

Hearing evaluations were administered by several different audiologists, each of whom brought a slight change in the approach to the evaluation, according to his own background of experience. Most of the hearing tests were set up to include a series of different testing situations spread over several days, and in which other members of the team also participated. During the child's entire stay in Syracuse, the whole team gave careful attention to observing how he was making use of what hearing he had and reported their findings at the final staffing.

All three general types of hearing loss--conductive, sensorineural, and mixed--were found to be present among the group, and ranged from mild to very severe. A few of the children were ascertained to have normal hearing and comprehension of language, although they did not talk.

A number of the children who had a hearing loss considered to be mild had never developed any language skills. These children were described as responding to familiar sounds within the speech range, and to some emotional tones, but there was no evidence that the sounds were analyzed in any meaningful way. Although most of this group obeyed strong one-word commands, it was thought to be because of the sound rather than through discrimination of the words. In some cases, this condition was due to organic brain damage, while in others it was attributed to the distortion or confusion arising out of perceptual dysfunction.

Regardless of the type and degree of auditory loss where one existed, only 12 children out of the series of 75 could be considered to be using intelligible speech and language at the time of evaluation. Of these, one had been a hearing child, who in spite of a progressive audio-logical condition, had had exposure to language and had been talking for several years before her hearing was lost altogether. One was a congenitally deaf boy enrolled in a school for the deaf, where he was successfully learning language, speech, and visual speech reading when retinitis pigmentosa developed to such a degree that it forced him to be transferred to a special department for the education of deaf-blind children. One was a boy with an atypical retinitis pigmentosa who was able to function in a residential school for the blind, although he was hard of hearing. Two girls had been taught language, speech, and vibration speech reading in deaf-blind departments, which they had entered when very young. Two boys, diagnosed as having cerebral palsy, had developed understandable speech, but manifested the typical articulation defects associated with the hearing loss commonly found in certain categories of that disorder. The other five children who used intelligible speech were diagnosed as hard of hearing, not deaf. The reasons for lack of speech among the rest of the children were as varied as the children themselves. Some of them could not have been expected to talk. Several had not reached a chronological age where very much expressive language would be expected even in a child with normal vision and hearing. The youngest child in the series was one year, ten months. Five children were only two years old. A few of the deaf children who had some vision had not been accepted in a school for the deaf at the usual age, and therefore had not been exposed to specialized training. There was a small group of older children who were rated as severely mentally defective. There was an even smaller number whose lack of speech was due to neither defective mentality nor auditory impairment, but was believed to be purely emotional. One little girl who made only weak, monotonous sounds was thought to have paralysis of certain parts of the speech mechanism because of muscular dystrophy of the scapulo-humero-facial type.

A large group in the series was composed of those children who had a mild to severe sensori-neural loss, or a mixed conductive sensori-neural loss, and those who were also functionally retarded throughout. Absence of speech, which could not be accounted for by the extent of the hearing loss, figured prominently in the retardation.

OTHER IMPAIRMENTS

One characteristic of the study group was the multiplicity of disorders that were found to accompany the blindness and deafness, good medical care in most cases notwithstanding. These other impairments included both acute and chronic conditions, and occurred in the mental and emotional areas as well as in the physical. Over two thirds of the children had acute or chronic conditions at the time of evaluation, in addition to the sensory loss.

The children came from all sections of the country and from many different racial strains. This resulted in a wide disparity in their appearance. Many were attractive, well-developed, healthy looking boys and girls. Others, however, were frail, under-developed, had abnormally small heads, or a discrepancy in proportion between the trunk and the limbs. One half the children in the series had been either premature babies or were born to mothers who had had rubella during the first trimester of pregnancy.

Both these groups were characterized by low birth weight. A quarter of the children in the total group weighed three pounds or less at birth, and two of them weighed less than two pounds.

The 1966 National Health Survey includes the following headings in its listing of acute conditions:

1. Infective and parasitic diseases
2. Respiratory conditions
3. Digestive system conditions
4. Injuries
5. All other acute conditions
    a. Diseases of the ear
    b. Headaches
    c. Genitourinary disorders
    d. Diseases of the skin
    e. Diseases of the musculo skeletal system
    f. All other acute conditions

Disorders in most of these classifications were present among the children, either existing at the time of evaluation, or having occurred previously and having produced serious after effects, including in some cases, the deafness and blindness. A few of the acute conditions could be treated or eliminated during the child's stay in Syracuse. Others were brought to the attention of the medical personnel in the child's home community for treatment or follow-up.

Acute conditions believed to have been the cause of loss of sight and hearing are mentioned above under Vision. Of those found to be present at the time of evaluation, otitis media, serous otitis media, and various skin lesions were most frequently mentioned in the reports, in addition to the common cold. One child had skin lesions on her hands and arms presumably due to her own removal of warts. Several children exhibited allergic reactions which were of various types. The presence of pinworms in one case and a mild sinus infection in others were also reported.

A number of the children were seen by the otologist, at first routinely, and then on referral when a medical problem appeared to be present, such as otitis media, and in one case, complete paralysis of the soft palate, with pooling of saliva and mucous. The otologist's recommendations centered around the treatment of acute and chronic disorders of the ears, nose and throat, and precautions regarding the use of a hearing aid during any acute episode.

One little girl was referred to a gynecologist for removal of a foreign body in the vagina, a not unusual occurrence among intelligent blind girls whose exploratory instincts may not be understood.

Many chronic conditions among the children fell into the province of the medical specialists. The largest number of referrals were made to the pediatric cardiologist. Heart conditions ranged from congenital cardiovascular deformity with recommendations for surgery at a later date, through various cardiac lesions for which surgery was not considered necessary, down to functional murmurs. These last were fairly prevalent among the group.

The neurologist noted hypertonicity occasionally and hypotonicity rather frequently, in the muscles of the children's arms and legs, and involuntary motion in a few cases. Convulsions were often mentioned in the histories, and one child had experienced a seizure within a short period before his appointment in Syracuse. Petit mal epilepsy was present in several children, not controlled by medication in every instance.

Orthopedic as well as neurological problems occurred in the children who had cerebral palsy. The child with muscular dystrophy was seen by the neurologist and the physiatrist. One child was noted to have had a spina bifida repaired with good results, and two children had had bilateral congenital dislocated hips which had been corrected. Congenital flat feet were also mentioned in several cases.

Many of the physical anomolies present were believed to be due to hereditary familial degeneration, and a study of chromosomal morphology was recommended in a few cases. The pediatric endocrinologist as well as other physicians reported multiple congenital anomolies in several children. Cleft palate satisfactorily repaired, and missing teeth were noted in one child who could feed herself but was finicky about the texture of the food she would eat.

Inconsistencies and abnormal behavior were exhibited by several children, sometimes on an emotional basis as referred to previously. A few children were diagnosed as mentally defective due to what was felt to be diffuse brain damage. Undetermined dominance was noted in at least one child. Comments such as "strange lack of coordination in the hands," or "reduced finger dexterity" were mentioned in the early records, but less and less as time went on. One could hazard a guess that the examiners gradually became accustomed to the situation commonly found among blind children of hands that appear soft and inefficient which are actually skillful and possessed of adequate strength.

SELF-HELP SKILLS AND ROUTINES

The functional retardation mentioned throughout this chapter was most conspicuous in the areas of self-help. While many of the children had been toilet trained, learned to walk, and acquired feeding and dressing skills at a normal age, others showed a marked delay in one or more of these developmental steps. Since such accomplishments should precede any formal educational procedures, a large proportion of the team's recommendations were aimed at bringing the children who were behind up to a normal developmental level.

A small number of children were reported as not walking, while a much larger number were able to walk but were habitually carried. Parent counseling on this subject could possibly have prevented flabby musculature in the children and perhaps stiff muscles in the mothers.

Three-fifths of the children were specified as toilet trained, although some of those considered toilet trained had fairly frequent accidents, and some of those who were not considered toilet trained could be kept dry by adhering to a reasonable schedule.

Many of the children fed themselves normally for their age, and ate a normal diet, but others were "problem eaters." Over two thirds were reported as feeding themselves, with a few of the younger children still at the stage of eating with their fingers, the recommended procedure for starting to teach blind children. A number of the children said to be able to feed themselves did not always do so.

Many of the children were slow in learning to chew, and some remained on junior foods or ate only soft foods like mashed potatoes longer than they should have. A number showed decided food preferences. Since adequate food intake is considered important not only from a nutritional point of view but also for speech development, recommendations were made to improve eating habits wherever necessary, including proper chewing.

Almost half of the children dressed themselves, although statements in the reports such as "she undresses better than she dresses herself," and "cannot do fastenings" are indicative of the level of this skill in some of these children. The lack of foresight in selecting garments that would be easy to put on and fasten was noticeable in the group as a whole, and applied to little boys' clothes as well as to little girls'.

A small number of the children had bizarre sleep habits and were up and about during the night when their families were asleep. A routine to encourage development of a normal sleep cycle in the child was explained to their parents with an urgent recommendation that it be followed.

INTELLECTUAL DEVELOPMENT

Intellectual development in the group was noted on all levels, ranging from the gifted child to the child who was severely mentally defective, with all degrees of cognitive ability in between. However, as has been noted, a large group of children were seen who could not be classified in these terms. Many of the children were considered to be severely developmentally retarded, and in terms of function were assessed as being "between the six and twelve month level," or "somewhere between one and two years." It must be kept in mind, though, that these figures merely showed the opinion of the team regarding what rung of the developmental ladder the child had reached. They were not intended to indicate an evaluation of the child's potential. These functionally retarded children who present problems in assessing their potential, are often a challenge to the evaluation team because of the interrelationship of physical, sensory, cognitive, and emotional factors. A wide range of development was noted in some of them, with remarkable attainments in certain physical and proprioceptive skills, accompanied by a failure to reach many of the developmental milestones expected of the nonhandicapped child at an early age.

Delayed development was thought to be due to numerous causes, some of them related to the child's overall physical or mental condition, and others to his environmental circumstances. Among the former were such factors as prematurity, failure to thrive, inadequate nutrition; among the latter, over-protection, understimulation, and decreased expectation due to presumed deafness, which in some cases was not present.

In many instances, the degree of retardation was difficult or almost impossible to establish accurately, because of the disorganized or uncooperative behavior of the child in spite of the most skillful handling. In these cases, periodic re-evaluation was recommended, or prolonged assessment.

EDUCATIONAL RECOMMENDATIONS

Educationally, deaf-blind children can be divided roughly into five groups:

1. Those with moderate to severe sensory impairment and academic ability within normal range who can achieve their intellectual potential only by means of the special education techniques available in a special deaf-blind department.
2. Those with moderate impairment who have enough remaining vision or hearing to learn through techniques devised for the deaf or the blind respectively.
3. Those with a mild sensory loss who can still hold their own in a regular school if skillful and understanding teaching is available.
4. Those who are either too young or too immature for formal education, and therefore require a program providing developmental stimulation and training.
5. Those who have been exposed to the special methods of training or education devised for deaf-blind children and who have failed to show progress after a suitable trial period.

Thirty-four children in the series had been accepted in deaf-blind departments where they stayed from one to 12 years. Three of these children were accepted at two schools and one at three schools, due to the closing of the departments which they were attending. At the end of this study, 12 of the group were still enrolled in deaf-blind departments, and recommendations had been made for changes or enrichment of their curricula. About a quarter of the children were not yet in school, but the team felt they were ready, and they were referred to a special deaf-blind department and accepted.

Among academic recommendations for the children who could attend these or other types of schools, were the following:

1. Enter or transfer to a special deaf-blind department.
2. Remain in the school for the deaf with special instruction provided.

3. Enroll in a hospital school, where physical therapy, occupational therapy, speech therapy, and special education would be provided.

4. Attend an educational program for emotionally disturbed children.

5. Attend an educational program for retarded children.

6. Arrange for pre-vocational training.

On the pre-school level, recommendations were couched in such terms as:

1. Provide stimulation through materials and people.

2. Arrange contact with other children.

3. Furnish an understanding setting for stimulation.

4. Arrange for attendance in a consistent organized program.

5. Arrange for attendance in a specific program which expects conformity.

SERENDIPITY

Although the Syracuse evaluations were set up to develop educational plans for individual deaf-blind children where problems existed in deciding what kind of program would be appropriate, as time went on it became apparent that there were other benefits in the program. The purpose of a comprehensive evaluation program for children believed to have a combined visual and hearing impairment can be threefold. The primary intent relates to helping a particular child. The other two objectives have to do with professional education.

For the child and his family, the evaluation should include:

1. Determining the physical, cognitive, emotional, and social condition of the child, and carrying out or recommending therapeutic or corrective procedures if required.

2. Assessing the developmental and educational level of the child, and recommending short-term and long-term educational plans.

3. Providing parent counseling.

4. Assisting the responsible agency to carry out or make referrals to the specific services needed by the child or his parents.

5. Following up the evaluation recommendations as requested.

Assuming that the case-worker accompanying the child reports his experience in detail to the personnel of his agency on his return, and the written report becomes available to them, the evaluation should prove beneficial not only to the child being evaluated, but also to other deaf-blind children served by the same agency. Certain basic concepts will be proferred which can be applied to the group as a whole. Hence, the evaluation can:

1. Provide staff education regarding general characteristics and needs of deaf-blind children.

2. Supply information about types of services required by deaf-blind children.

3. Improve communication with the families of deaf-blind children.

Additional functions of a comprehensive evaluation program have a more general goal and one which ultimately can help many children. One purpose is to build up a body of knowledge relative to the process of evaluating deaf-blind children, and make it available to others elsewhere. Such information can be disseminated through personal contact, lectures, films, recordings, and writing.

Where a program of the type described here is located in a college or university, it can also provide an opportunity for observation, study and participation to undergraduate, graduate, and visiting students in various disciplines, particularly the fields of health, education, and social work. These multiply handicapped children, in process of being evaluated by a team of experts, can afford students at all levels an orientation to multiple impairments which is unique.

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ADMINISTRATION

Edward T. Donlon, Ed.D.

Intensive evaluation of a severely handicapped child takes time, more time than is available in the four and one-half days usually set aside for the evaluation of these children at Syracuse University. Hours have been spent before the family ever reaches the Center for the Development of Blind Children. The Center's staff alone spends an average of 75 hours in organizing information, scheduling, conferring, and generally preparing for a period of time which is extremely demanding of the staff and inconceivably stress-producing on the parents, the child, and the professional person accompanying the family. After the family leaves, at least one full week's secretarial time must be allotted to typing reports and writing letters of inquiry to the child's home area to clarify points, verify impressions, and validate results. This does not include the literally hundreds of hours usually spent by the referring agency--The American Foundation for the Blind--and the state and regional groups responsible for collecting data and investigating its authenticity and completeness.

Apprehension does not adequately describe the administrator's feelings each Monday morning when a group arrives. A combination of tasks are immediately presented. Explanation is necessary to relieve anxiety caused by the unknown. The group must be prepared for long waits, shifts in schedules, and hundreds of questions from various team members. Questioning of the parents needs stimulating. They must be posed at appropriate times and even then are frequently not answered to the questioner's satisfaction. Many statements and situations will be misunderstood. All of the factors evident in non-verbal communication are present and usually their significance is not recognized. It is difficult to remain aware of these even in a psycho-therapeutic situation under infinitely more control in time, space, and other variables than is the present environment. The existence of these problems is recognized but their consequence cannot be assessed under these conditions.

During these original few moments, many details are immediately presented to the administrator and must be attended to. Other more general factors assume importance when conditions warrant. The atmosphere is extremely important. The feeling that each person cares and is interested is difficult to maintain. Without an environment which connotes this acceptance, concern, and many other unlabeled but positive factors, basic evaluations cannot be carried out. The administrator must be aware of this and constantly assess this environment to ensure that the evaluation takes place with minimum discomfort for all and a maximum of efficiency in evaluating and communicating the results.

GENERAL PRACTICE

Each specialist on the clinic staff sees the child and his parents for a scheduled amount of time. Before and after this time, discussions and observations are carried out to further become acquainted with the problem and to formulate ideas about further evaluation needed by that person or subsequent referral to other specialists not presently on the schedule. Even though records of previous evaluations are voluminous, the staff frequently feels other evaluation is needed before an adequate description can be given.

The description is an important part of evaluation. Without adequate description, a frame of reference cannot be established for predicting a program. One might envision description as developing in a fluid manner from a general body of knowledge about the child which incorporates specific information in several areas, after which it is finally brought together in a meaningful composite at a higher level to form a basis for prediction and program.

The initial body of knowledge comes from referral information and reports of previous evaluations. Children in the group under consideration have had contacts with representatives of many professions. This usually correlates with the stated handicap or handicaps as recognized by the parents. If the child is seen as being blind then one can expect many ophthalmological examinations. A deaf child likewise has an abundance of contacts with the audiologist and otologist.

The secondary and major source of data comes through the information collected by each clinician. This takes the form of results from evaluations and their analysis by the clinician. Included with this is the specialist's analysis of historical information he collects.

Final data collection may be related to the group communication effort during the evaluation period and the final staff conference. Interchange taking place at this time adds considerable efficiency to the processing of information as it is collected by each member for the team. Even after the evaluation has been completed still more data are collected, and recommendations made. Some of these are dependent upon other material being collected and reviewed by pertinent staff members.

The approach toward a comprehensive evaluation comes from a composite of each specialist's efforts plus the merging of these with extra information provided by parents and accompanying personnel. This information is given in several ways. Formally, of course, there are the reports and referral information supplied prior to the appointment times.

Perhaps more valuable, however, is the information obtained from informal contacts with the family and caseworker while in attendance at the clinic. This comes from interviews and questionnaires and also from comments given during observation periods, meal times, and idle times between appointments. The collection and organization of this information makes it possible to attach more validity to the conclusions and recommendations than could be attained through the more fragmented approach ordinarily used to evaluate these children.

The coordinating role of an administrator is frequently important to aid communication between disciplines during team evaluations. Because of differences in schedules, the questions, comments, and recommendations are often handled second hand by this person, who is the only one available for all evaluations. Interchange here may take the form of clarification. Two views may appear to be conflicting about a specific symptom or conclusion. "There is no apparent neurological impairment" must be related to the statement that an "awkward walking pattern combined with mild muscle incoordination and visual motor perceptual problems lead to a probability of central nervous system damage" must be resolved. Someone must be aware that a difference exists and must share in the responsibility to resolve it. Clarification of terms by persons involved may lead to agreement in diagnosis, or it may culminate in further referral or recommendations. If it can be approached and resolved before the end of the week a more complete analysis may be made. It is also important to recognize inconsistency and incompatibility in conclusions offered by team members. Recognition does not lead to resolution, but it allows for efficient handling of each problem and promotes communication. The appropriate person to recognize and make interpretations of this type will depend upon the experience and training of those who may have this responsibility. If this is not within the capability of the administrator then someone else on the team should perform these duties.

A TYPICAL EVALUATION

Here it is appropriate to provide in more detail a description of the typical evaluation clinic held for these multiply handicapped children. From this, broad goals may be specified for evaluations of this type and a rationale and role description developed for the administrator of the program. It is maintained here that the coordination and administration of such a program is a key factor in providing for adequate evaluation.

Several specialists routinely evaluate each child coming to the Center. The medical staff includes representatives of three fields, pediatrics, ophthalmology, and neurology. A speech pathologist and audiologist examine the major avenues for communication. An educator and psychologist investigate learning characteristics and general adjustment. The social worker is most interested in the family and community attitudes. Other persons may be called in on referral by any of the specialists. Medical personnel referrals frequently include cardiologists and otologists. Special educators of the deaf and blind also participate. The otologist and pediatric cardiologists frequently see children, especially if there is a suspicion that the child's disorder is related to maternal rubella. With severely multiply handicapped children there is often a concern that the disorders are caused by chromosomal imbalance. In such cases the pediatric endocrinologist is consulted.

ORIENTATION SESSION

It is advantageous for all persons coming to the clinic to participate in an orientation session. This allows a structure to be developed within the group. The families can be prepared for certain inevitable delays and learn something of what to expect. They are encouraged to question and comment on anything that happens. It also is an occasion to outline the goals of the evaluation. At this time, it is also important to stress that one answer will probably not be given. Parents want to believe that they will now be told what to do with their child. It is difficult and uncomfortable for them to think in terms of possible programs which usually have alternatives. The clinic's goal of describing an ideal program can be verbalized, but the consequences of this are not as easy to envision. It is especially encouraging, however, when they realize that another goal of the evaluation is to suggest specific programs and to follow through on making the necessary contacts for appropriate referral.

Since a professional worker from the home area accompanies each family, this initial conference also provides an opportunity to outline his role in the evaluation. Hopefully, he has worked with the family for some time and has good rapport. This allows the family to communicate with a familiar person. It is especially valuable since this person can help in the interpretation of answers to the family. He also has a knowledge of the procedure by which many of the recommendations were obtained.

PEDIATRIC EXAMINATION

After this initial conference, evaluations are begun. One basic concern is the general health of the child. Having the pediatric examination first makes it possible for additional referrals to be made should the pediatrician feel any are indicated.

The pediatrician, as one of the first to see parents and child together, can create an attitude for the rest of the week. When this is positive, much of the anxiety brought to the clinic is dissipated. Acceptance of the client's deviant behavior immediately relaxes the rest of the family. Frequently this is noted when the child begins to test limits by investigating his surroundings during the time when the pediatric history is being taken. Composure and lack of concern by the pediatrician invariably has a leavening effect.

Physical facilities also help in such situations. The fact that this and many other evaluations are conducted in a spacious play therapy room means a minimal need to restrict. Concern for details in the environment and a mature accepting attitude allow for much to be accomplished in the way of rapport and increases the validity of the evaluation. It should be added here that the professional integrity of the entire staff is extremely high. All are competent at working with difficult children. It is also important to note that there are few signs to indicate this is a "clinic." White coats and other signs of a clinic are seldom seen and *never* present early in the evaluation before good rapport has been established with at least some of the staff.

SOCIAL CASEWORKERS EXAMINATION

The casework evaluation is also especially useful if carried out early in the week. Symptoms such as incompatibility, rejection, or extreme anxiety can be outlined at this time and investigated further during other sessions. Careful attention to the parents at this time also reinforces the fact that the evaluation is of the family as a unit and that factors which may never have been considered before are important. Each team member collects historical data related to his own professional interests. The social worker's evaluation is especially valuable in supplying material about the family situation and general environment during the child's early development.

Frequently, the professional person accompanying the family is of similar orientation. When this is the case, communication between the staff social worker and the visiting professional is appropriate and necessary. Such a contact allows for increased efficiency in both time and amount of communication carried out.

As the evaluation progresses, one of several disciplines now becomes appropriate. The persons dealing with the child's behavior must begin to analyze functional ability. Members of the speech pathology group frequently combine with child development personnel to make initial observations and determine further types of evaluation needed. From this point on in the week, parents' observations and comments are of extreme importance. Parent observations are encouraged throughout the evaluation periods. Their comments provide valuable information about the child and his home environment. Several techniques are available to facilitate the observation process. One way mirrors are especially useful as are closed circuit TV and video and audio tape recordings.

SPEECH PATHOLOGISTS EXAMINATION

The speech pathologist is concerned with all types of communication. Most children attending the clinic exhibit little if any response to auditory signals. Nor are they verbally communicative themselves. Those with usable hearing frequently use it only to avoid further contacts. Some produce distracting sounds for this purpose while others have perseverative vocal patterns and echolalia. Most, however, because of previous screening, which admits only those with visual and auditory problems, demonstrate little or no awareness of meaningful auditory material. Similar behavior is noted when there is some measurable visual ability. Unless there is considerable motivation, there frequently is no desire to receive material through either sensory modality useful in the communication process.

When these situations do exist, the speech pathologist is concerned with levels of ability and with approaches for promoting better communication in a variety of circumstances with the child. Since quality and quantity of responses are frequently situational and dependent upon various types of observations, careful planning is necessary to make available the variety of situations and time necessary to place the child in this varying environment. Schedules must be examined so that all persons will have adequate time to carry on individual evaluations and yet the child's and his family's endurance is also important. The tension produced in the act of observing one's child is extreme. In fact, severe fatigue comes about when a person is merely sitting for that number of hours. Add to this the knowledge that others are observing you or the fear that perhaps your child will not behave, and it is easy to see that limits of tolerability will be approached.

The child and his family need constant consideration in this area. The fatigue factor needs to be determined and does play a part in program recommendations. It is not, however, advisable to approach these limits daily. The administrator must be aware of these points and promote situations that reduce the chance for them to occur. One way to do this is to merge some parts of the evaluations which may be common to more than one team member. In this case, the educational psychologist and speech pathologist may jointly carry out their tasks.

PSYCHO-EDUCATIONAL EXAMINATION

Several approaches have been used to assess the factors related to psychological growth and development. The many areas involved are given more detailed treatment in another section of this document. Education in its broad sense is related in this instance to motivation and learning characteristics. The differentiation of problem areas in these factors to develop a profile which also considers adjustment and other behavioral characteristics also comes within the realm of education and psychology. Since there is a close relationship between these areas especially in a large proportion of the children considered here, the discipline of the educational psychologist is most appropriate to describe this area.

Persons dealing with communication and psycho-educational functioning each have somewhat exclusive test batteries. The administration of these may be formally accomplished at separate times during the evaluation sessions. A major proportion of these evaluations, however, is carried on through observation of behavior in a variety of situations. These may be conducted with any number of observers so long as the facilities are available. The child's reaction to these and his ability to learn from them are of utmost importance in describing possible programs.

Details of the child's interest in objects, people, and situations must all be inspected. Consistency and inconsistency of responses are important. Responses to varying intensities of stimulus in different sensory modalities are also useful. The descriptive process around this behavior must begin by establishing as accurate and specific a base line as is possible for many segments of behavior. This, with the addition of further material on useful approaches to modify this behavior, allows for additional specificity in program definition.

The behavior analyses provided by these sessions are also useful to other team members. Either direct observation of the procedure or indirect evidence provided by the evaluators allows for further checks on the validity of each staff member's conclusions. An important goal of this approach is to increase functional ability of the child in any or all of the areas observed.

The sensory areas of vision and hearing are essential to learning and communication. Unfortunately they are also the areas affected by most children seen at this clinic. Those who do not have a severe acuity loss in each modality frequently function as if they did. Both audiological and ophthalmological evaluations are important to the psycho-educational observant.

Their accuracy depends upon similar factors to those listed above. Conditions of cooperation must exist between personnel in these areas and various opportunities to observe and describe behavior are also necessary here for accurate assessment.

AUDIOLOGICAL EXAMINATION

The audiologist must have several testing environments available. Sound-proof rooms and non-acoustically treated environments are both necessary as is enough time and the necessary equipment to produce many types of sound. A variety of meaningful and non-meaningful sounds are used and responses of the child recorded. Exact assessment with pure tones yielding a specific audiogram is usually impossible. In this evaluation as well as in many others, arrangements must frequently be made for observation and interview time beyond that which has been scheduled. Fortunately, again, some sessions may be combined so that evaluation of this modality in part at least is carried out in conjunction with others.

It seems that the auditory ability of a child is of more concern to parents than almost any other area. This is especially the case when children show even a slight ability to hear. In these cases, parents seem to need more interpretation as to its significance and its meaning for future development. This is one of many instances where careful attention must be given to parents' questions and care must be taken to answer with careful interpretation.

OPHTHALMOLOGICAL EXAMINATION

The ophthalmologist supplies needed data on other basic sensory modalities. Visual ability is important and frequently not used meaningfully. Those children with even the slightest amount of residual vision can usually become more efficient in its use. Because of the many primary and secondary disorders associated with visual defects, however, there are a multitude of problems relating to assessment of this area. The eyes also are a frequent site of pain and constant medical attention. For this reason, care must be taken in the approach to assessment of eye health as well as visual ability. Diagnosis is frequently an important consideration for prognosis. For this reason, the ophthalmologist is often under pressure to provide an accurate diagnosis and is frequently hindered by extreme anxiety on the part of the child or family.

Because of the many types of eye disorders there must all too frequently be a guarded prognosis for future visual ability. This often puts the staff in the unhappy position of recommending intensive use of vision to develop concepts with the possibility that sometime in the foreseeable future total loss of sight may be predicted.

NEUROLOGICAL EXAMINATION

The neurological examination determines possible physiological bases for many problems. The neurologist also must make every effort to isolate areas of the central nervous system affected by the agents which in the past caused the child's problems. With all severely multiply handicapped children many things can be wrong with the nervous system in the categories considered by the neurologist. Clumsiness and balance problems are especially noted by the neurologist. Physical symptoms such as these make it possible for comment about neurological involvement that could lead to drastic program modifications.

It was indicated earlier in this paper that communication must go on constantly between disciplines during the evaluation. Since there are seldom definitive conclusions reached by any staff member before questions have been asked of others or observation made by others, there frequently is no final completion of an examination until all others have been concluded.

This creates an ambiguous situation for the final conference. But an important attitude is continually exhibited. There is the feeling that all disciplines are trying to share ideas and reach conclusions about the total nature of the child and his family. This is a unique situation since it frequently leads to a crossing over of disciplines without accompanying threat to the individual's ego. The speech pathologist, for instance, feels free to comment on the neurological abnormalities noted in certain areas or the pediatrician may have strong feelings about the family's emotional health.

FINAL CONFERENCES

Before the final staff conference and after evaluations have been completed, parents are invited to participate in a summary of general findings regarding the child. At this time they are aided in verbalizing questions that will be brought out in the professional meeting later on. During the process of summarizing these findings, several categories of recommendations are usually available. Some reaction of the parents is valuable at this time as it allows for assessment of acceptability by the family and gives an indication of the effort that might be expected in carrying them out.

This session is especially devoted to stressing procedure and lines of communication to be used in the future. The family is essentially placed back in the hands of the accompanying professional person. The door is not closed on communication with the clinic, however. It is indicated that follow-up procedures will be instituted by the Center, but the major energy for following recommendations should come from agencies in the local region. This structure is important as there is a need for direction to next steps in the process from evaluation to instituting a treatment program. Ideally there should be no delay and, in fact, evaluation should accompany treatment. Hopefully this situation will exist after the initial evaluation is completed.

In one sense, the most exacting period of the evaluation comes with the final conference. It is often difficult, however, to maintain the needed direction at this session. It is possible for the clinic staff to be concerned with one aspect of a case and lose track of the total situation. The complex and usually frustrating problem of defining an ideal program is surpassed only by the more frustrating problem of describing a specific program available to the child and recommending steps for possible placement. The near total lack of any type of treatment program makes it possible to see why many clinics avoid the task of evaluating these children. In nearly every session some or all team members make statements to the effect that "if only there was this or that type of program." Too often there is not.

With all of the apparent despair, concern, and frustration, however, there is always by the end of the meeting, a set of specific recommendations for each area considered and one or more placement possibilities. The fact that closure is usually obtained through both specific and comprehensive recommendations is undoubtedly one reason for the continuing interest on the part of each staff member and for the support given by each to a program of this type.

It was suggested earlier that the evaluation program must in some way merge each individual's specific evaluation effort with an effort by all to attain common goals. A total and cohesive approach must always be in someone's thoughts. If not, it is easily lost among the intense and specific interests of each team member. Possible relationships between two staff members, findings cannot be suggested unless one or more persons are continually aware of these various findings and have the capacity to interpret each and synthesize the many facts under consideration.

OTHER PERSONNEL

The Evaluation Center at Syracuse University has a valuable resource in graduate and undergraduate students willing to work with these children. These people usually have considerable ability and flexibility in relating to children who are difficult to work with. Students are not a necessity, but persons with similar characteristics are. There are many important tasks that can be accomplished by such persons. It is especially valuable to have a person available to take a child and be with him as a relief for the parents. Frequently persons with some training in observation and an ability to play with the children can add much to the evaluation picture which could not be attained through the more limited resources of the specialist. This is most often the case when some direction is given to the observation and the type of behavior desired. There are other duties which may be performed by such persons when they are available. Experience and direction through in-service training makes them even more valuable.

The previous description and brief outline of a typical evaluation session for multiply handicapped children suggests several categories of duties for the administrator of such a program. It is not necessarily maintained here that one called an administrator must have duties and responsibilities as outlined. Conceivably the administrative role could shift with personnel. Certain responsibilities could be delegated to various persons depending upon the nature of the problem. It is maintained, however, that certain duties and responsibilities must be assumed by someone if a program is to exist. It is the discharge of these duties which makes the program a success or failure on many counts.

TABLE I

Number of Team Members and their Professional Fields (1957-1966)*

Administration (Coordination)	3
American Foundation for the Blind Representative	3
Audiology and Education of the Deaf	5
Education	4
Gynecology	1
Neurology	6
Ophthalmology	2
Orthopedic Surgery	1
Otology	3
Pediatric Cardiology	3
Pediatrics	2
Physiatry	1
Psychiatry	2
Psychology	14
Social Work	2
Speech Pathology	3
Vocational Counseling	1
Total	56

*The workers who accompanied the child to Syracuse also participated as members of the team.

OTHER CONSIDERATIONS

Many details must be considered before and during the evaluation. Complete and adequate records and referral information must be collected and duplicated. These must also be disseminated to the specialists involved and reactions obtained from them as to their adequacy. From this information, further hypotheses may be formed about the need for extra studies or even the possibility of decreasing regular evaluations usually needed. There are a multitude of details to be considered. Specific listing of them is of little value here since they change somewhat with each session. They are important, however, and lack of attention to them may seriously hamper the clinical operation.

There are other problems requiring more serious consideration and more intense efforts by the administrator. The coordination of personnel to produce efficient use of staff and time has been considered. This duty cannot be overstressed. It should be of constant concern to someone in authority and should be foremost in that person's mind during the evaluation period. The communication aspect must carefully consider human nature and problems involved with interdisciplinary relationships as well as stereotypes consciously or unconsciously held toward other disciplines by each staff member.

This task involves perception as well as skill in analyzing and modifying relationships and attitudes. It also requires a degree of status and achievement within the hierarchy of the supporting agency. It does not mean that all persons must be of equal rank in a university or hospital but there are aspects of this that require careful consideration.

The role of the administrative person continues from the professional staff conference to the editing and final production of reports. Frequently, it is important to summarize findings and conclusions differently than it is presented.

It is difficult here to establish rules as to the degree of editing and summarizing appropriate for a person not trained in the writer's profession. Recommendations from the staff conference help and may give guidelines for statements made in this summary. It is also necessary to contact persons involved and reassess statements made. It takes time and intelligence on the part of the administrator to even formulate appropriate questions. A service is provided, however, if the person responsible for editing and summarizing is also acquainted with the language level of those who will read the report. The summary then may be of considerable value, especially if it brings into focus points of importance in a meaningful and structured manner.

Another necessary element of administration connected with any identifiable clinical program is guarantee and perpetuation of the clinic's identity. In simpler fashion, this means that someone must be available to speak for the program. It is nearly impossible for this person to be one of the specialists in the program responsible for his own area and also responsible for being the community liaison person to the clinical operation.

There are a multitude of problems and considerations about the orientation of others to any clinic. Visitors, prospective clients, and professional peers, need personal contact with someone in authority who is knowledgeable not only about basic clinical practice, but also with a full understanding and participating responsibility in the development of a philosophy and theoretical application toward such a clinical procedure. Participation is a key concept here, and an integral one for analyzing involvement of persons connected with the Center.

Almost no attention has been given here to other reasons for existence of an evaluation program than service to child and family. The present chapter is not written to justify such a program or to describe the theoretical and research possibilities for such a program. It should go without saying that such considerations should be an integral part of any center's operation. It is recognized, however, that research cannot be solely supported in an evaluation program. For this reason the following comments are offered.

RESEARCH AND DEVELOPMENT OF DEVELOPING METHODOLOGY

In order to do this, active support by a parent organization is a necessity. This must come in the form of fiscal aid so that long term plans can be developed that are not dependent on current operating funds. More important, however, is the support exemplified by commitment to a theory of evaluation. Rationales for this will depend upon the overall goals of the supporting agency. Some may have a basic emphasis on service or professional training. Others may be especially interested in research or theoretical development with the goal of developing and validating a method. It is recommended here that all these factors be in evidence to some extent. When this is possible there can be more flexibility in administration and in using staff time and interest in a variety of ways.

It is impossible for this writer to conceive of an evaluation procedure as described in a physical environment that does not include many supporting professional specialists and laboratory facilities. These are assets to any program of this type. This presence makes information available in a manner not possible through mailed reports or secondary contacts.

PSYCHOEDUCATIONAL EVALUATION

Edward T. Donlon, Ed.D.

INTRODUCTION

Several factors affect a normal child's development and functional ability. Environmental factors and physical abnormalities may be considered as the two general categories that modify his development. Assessment of these factors with their singular and combined effect on the person's behavior is the task of the evaluation team. The psychoeducational assessor must gather information from other team members and integrate this with his own findings as a basis for recommendation toward a treatment program.

Many basic and standardized procedures are available for evaluating children with mild and even moderate handicaps. These are usually not appropriate for the more severely handicapped, and children with multiple disabilities can never be totally evaluated with the procedures used for children with less devastating disorders. This does not mean, however, that one should not apply techniques used for other groups. Nor does it mean that statements should be withheld about the suspected capabilities of the child based upon the evidence available. Care is certainly needed when interpretation of results is made, and caution is always necessary in prognosis. There is no room in this setting for the rigid clinician who negates subjective results if objective scores cannot be obtained through valid test administration. Persons using this approach usually add nothing to the evaluation and frequently only compound the problems since the child now has a number or label attached to him even though it is based on an invalid test.

Several parameters are evaluated as the psychoeducational assessment is carried out. These may be weighted and each one's contribution to the subject's functional ability can then be analyzed. Statements can also be made about the validity of the results when several variables are considered relating to the test situation and the child's cooperation. It is obvious that this will vary with each child being evaluated and the validity of the results will depend upon these variables.

The procedure of this evaluation begins with as complete a description as possible of the child's assets. These may be categorized in several ways, and can be sorted as to their related effect upon the total functioning individual. The conclusions derived from this procedure will then form the basis for description of a program. Individual needs isolated by this description makes specificity possible for devising special teaching and therapeutic sequences.

It is the purpose of this chapter to describe general procedures used by the author for obtaining information about the various parameters assessed for children who are not severely handicapped. With this orientation, it will then be possible to comment on the categories as they differ when applied to multiply handicapped children.

A developmental orientation is generally used since this seems most appropriate to the analysis of the children under discussion. It also fits best with their learning characteristics and the general recommendations for long term programs and predictions of their results. Constant consideration must be given to the professional team. Maximum results of the present technique can only be obtained when specific findings of each evaluation can be related to others. In this manner the final result will be most useful as an initial basis for program development. After the team evaluation has been completed, it may then, of course, be possible for others to continue individual studies on a more longitudinal basis and for the specific application of recommendations made and the assessment of results obtained from the treatment program.

EVALUATION PROCEDURE

It is necessary to have a common meeting ground to begin assessment of any child. When this is not possible, there are other ways to gather secondary information about the behavior and general development. These techniques are always used, but it is much more advantageous if they are applied in conjunction with more direct procedures rather than relying upon them in their entirety.

SECONDARY DATA COLLECTION

Historical data such as developmental information, anecdotal records, and school achievement records are one source of useful secondary materials. Their accuracy depends largely upon the objectivity and orientation of the collector. Their usefulness depends upon the questions asked by the collector before gathering information. A well organized summary of observations about a child's development is especially useful to any clinician before, during, and after he sees a child.

Scales such as the Vineland Social Maturity Scale and the Maxfield Buchholz Adaptation for pre-school blind children are of value in collection of data through an informant. Their organization into skills categories provides a useful model and valuable structure for interviews with parents, foster parents, or treatment personnel familiar with the child's present behavior. A lack of sufficient items at each level in each category necessitates more detailed interviewing; but the general framework is still especially useful for gathering information from those who are not familiar with psychological jargon.

Materials from the Cattel and Gesell Scales may also be used as a basis for interviews and for structuring secondary data collection. These scales for young children are based on physical and motor development with attention also to communication and simple problem solving. This material may also be used for observation of the children and for beginning more direct and formal assessment.

Some parents maintain diary type materials useful to the evaluator. Frequently, instructions are given to keep records about the average day or about specific parts of the day or responses of the child to certain situations. This type of information gathering is usually not possible during the initial evaluation period. It is a basic premise of this writer, however, that evaluation must be continuous during any treatment procedure. It is for this reason that suggestions are made for the longitudinal considerations even though the initial evaluation has been basically completed after the first four days.

Other types of secondary information gathered are historical data as found in records, pediatric reports, school achievement records, and previous psychological evaluations. All of these are useful in supplying information about the child's behavior and other important factors during previous periods of his life.

Careful analyses may be made of this material to provide a picture of the child during periods when he is not in the clinic. This supplies the reviewer with the developing perception of a family through the recognition, realization, and some acceptance of the fact that a handicapped child has become one of them.

These statements not only yield clues about the professional's perception of the case but also provide a summary of the family's direction in seeking help and the intensity of their efforts in obtaining professional consultation.

PRIMARY DATA COLLECTION

To begin the analysis of a child's development, and his potential for future development is possibly one of the most complex problems facing persons concerned with human behavior. The nearly infinite number of variables to be considered and the individual differences evidenced by each child in his normal growth pattern allows us to observe at any moment only particles of the evidence necessary for understanding. An attempt to describe the process for accomplishing this in written form is an impossibility, only general guidelines may be presented, and it must be stressed that these are tentative. Quite possibly, they are not comprehensive enough for other evaluators. They most certainly do not follow the theoretical outlines offered by others. This statement is not offered as an apology so much as it is offered for introductory purposes. The points discussed in this section have proven to be valuable when applied to the multiply handicapped children considered in this manuscript. They are not offered as a model for the psychoeducational evaluation of other groups where different behavior syndromes may be observed.

For the purposes of this chapter the term psychoeducational is used. It is felt that this group's development is especially dependent upon the interrelatedness of the two general areas considered by the terms psychology and education. As has been previously noted the general orientation is based on a rationale for the developing child and his interaction with the environment.

This allows for analysis of behavior based on the childs' functional capacity in a variety of situations. Interpretations may then be made on the basis of learned responses to these situations with allowance for handicapping factors within the child and abnormal environmental conditions resulting from these handicaps and their effects.

There are many models available for describing variables involved in evaluation. Rather than use one of these or developing a new model it seems more appropriate to describe general areas of consideration, and some techniques involved in their assessment.

Beginning response of the child to adults must first be determined. If behavior toward others can be observed first, some situations may be avoided that would otherwise serve to inhibit establishing adequate rapport. Sometimes the process of introducing one condition at a time will make contact easier to establish. When a child has been allowed to investigate the surroundings, then it is frequently easier to begin getting acquainted in that place. If necessary, at a later time the move may be made to a more suitable location. It is important to recognize any responses that a child makes to his environment, and to note any recognition that he has of changes which take place as come and go, as light and sound variations, or any other similar signs of his awareness evidenced. Attention to these details make it possible to summarize the general sensory abilities of the child. It is also possible from this observation to make general comments about tolerance of change and preference for specific persons and objects.

With the information supplied by this type of contact, an examiner can then begin manipulating on his own to determine the child's capacity for reacting to a number of new stimuli. If curiosity is in evidence, several new materials may be introduced. A curious child will display many thought processes through his selective attention to materials. The variety of these materials is unlimited as is the degree of information obtained from them. Much can be determined about the child if the examiner is only passively involved. The complexity of materials introduced and the child's use of them in a non-structured situation makes possible considerable analysis of many characteristics.

Three general areas need assessment early in the evaluation. The functioning of all sensory modalities form a basis for the types of more formal tests to be administered. Reaction to light and sound gives information about the primary input areas of sensation. Touch and taste are used to a lesser degree by most children but there are times when these are used almost exclusively by severely handicapped children. The willingness and ability to communicate is another important area to be considered. The child's responses to others and his reaction to situations, whether it is in a positive or negative fashion, is important to describe. This is a most basic area for further evaluation and all too often it is least developed in the children seen. Evaluation of skills comprises the final area of general assessment from this beginning observation period.

FUNCTIONAL SENSORY ASSESSMENT

It is necessary to differentiate sensory abilities in several ways. Each modality should be individually evaluated. These must then combine to determine preferential considerations and to note possible ways one modality may enhance or inhibit another in the information gathering process. One usually thinks of these children as needing multi-sensory stimulation at or above threshold levels. Frequently, this is not the case and the addition of a new channel will often be confusing or distracting.

Functional thresholds vary with the situation in all sensory areas. To some extent a degree of inhibition in each is necessary. If this were not true the person would find it impossible to attend to such things as reading or listening to the radio. Abnormally, the lack of an ability to suppress extraneous stimuli leads to distractibility or inattentiveness to the stimulus which is supposed to be dominant in the presentation. This by its nature leads to inhibition of the input material and a minimization of the learning experience.

A minimal threshold in these sensory areas can be increased in other ways. A person can semi-consciously decide that he will not perceive something and it does not happen, or this may be learned as the traditional hen-pecked husband learns "not to hear his nagging wife." Some may, by process of superattending through one modality, so increase the threshold in another that perception cannot be obtained. Some multiply handicapped children seen in the present population can attend to a flickering light or broken mirror in such fashion that it is literally impossible to break into their consciousness. The same may happen with severely disturbed children. It is suspected here, however, that these children are aware of their surroundings and merely decide to behave as if they were not perceiving the stimulus.

It is important to differentiate these possibilities when confronted with the subject who does not seem to perceive. First, it is necessary to determine functional levels and then form hypotheses as to causative factors. If cooperation has been obtained from a child, and the examiner is reasonably sure of the response validity and expressed motivation of the child, then the task is considerably simplified. If there are numerous unexplainable behavior manifestations and breaks in established techniques for communication then considerably more care is necessary in making interpretation of a child's sensory capacity. For the purpose of this section it will be assumed that these do not exist and that the child is giving his utmost cooperation with maximum motivation.

All sensory modalities have a high degree of interaction which must be recognized. Functionally, as has been noted, this may increase capacity or it may inhibit ability. The goal of sensory assessment here is to make an accurate determination of both ability and the process by which it is used.

Visual ability may be recognized in a variety of ways. Normal sight can be assessed by any of several techniques depending upon the child's developmental stage at the time. The older he is, of course, the finer and more specific one may expect the examination to be. It should also be recognized that the ophthalmologist can nearly always evaluate the child's visual ability even if it has to be done under anesthesia. Information gained by this means is valuable and accurate, but it is more useful if a functional evaluation is completed and a differential is obtained between the possible visual ability predicted by the ophthalmologist and the amount of use the child is actually demonstrating.

The beginning impression gained from observing the child's investigative behavior provides for an outline description of his total visual ability and its use, at least, during this brief period. A gross initial breakdown between near and distant visual ability is necessary. The active child going about the room will generally not bump into objects. This is true whether he has normal sight or is totally blind. A difference is noted in the patterns of movement and the way a child investigates unerring visual localization toward attractive objects is of course a sign of visual acuity and based on a level with the stimulus value of the object. The child with sufficient sight to carry out this type of localization will quite likely avoid furniture and other objects in his path.

One who is not attracted to visually stimulating objects on the other hand is not necessarily blind, he may only be disinterested. This is also the case when objects are presented close to his eye level. Many have long ago decided they will not look. It is of value here to determine that a child has visual interest in objects, and then by moving these objects, notation may be made of the distant visual acuity measure. The above assumes that the child is non-verbal but mobile. As verbalization and educational levels increase, direct testing may be accomplished in many ways, by matching objects, identification of people and objects, or by simple recognition.

One must be aware of the possibility that visual fields may be restricted. In such cases the child might easily localize on an object and still walk into obstructions. He may also be more prone to startle when objects approach from angles slightly out of his line of sight. As maturity increases it is quite easy to test by asking for visual awareness to targets at several angles out of his visual field. Generally, however, the ophthalmologist must be consulted for an accurate description of these processes.

Some children will appear to have severe visual loss without correction. If one can gain cooperation with appropriate corrective lenses, their visual functioning markedly increases. This is sometimes the case with extremely myopic children. Many have rejected glasses for one reason or another. The weight alone was a problem before plastic. Also, increased correction restricts visual fields. Some children have decided that they would rather have mobility than good acuity. They need to be "taught" to use glasses for the purposes intended and to realize that things seen by this method may be especially interesting and useful. Knowledge of eye disorders and their effect upon vision is a must when evaluating any child with visual abnormalities.

This information has been outlined by the ophthalmologist and will not be considered further here. It is important to realize that children, to a degree, vary predictably with any typical eye disorder. There also is a degree of unpredictability which seems to be dependent upon several other factors, such as, self concept, motivation, and the stress placed upon seeing by the family and school.

Care must also be taken to observe external features of the eye. During the clinic session these features are carefully evaluated by the ophthalmologist. After this they are not under such careful professional supervision so consideration must be given to all abnormalities. Secondary causation factors seem to play a more important role in functional vision than many realize.

There are a number of conditions that lead to decreased effort at seeing. Such things as conjunctivitis may be so uncomfortable that the child will rely on other sensory avenues in preference to the eyes. Similar problems are encountered when secondary factors cause a cosmetic problem. Many will close their eyes or hide behind dark glasses rather than expose the condition to what they perceive as an unfriendly environment. Care must be taken in these cases to evaluate the total situation and to be certain that adequate supervision and therapy will be provided.

Functional auditory assessment is the next major sensory area to be considered. Careful observation is again important in differentiation between the various sensory capabilities and their relative importance in the process of gathering information. Historical data are especially useful here. Parents' comments about reaction to sound in many situations is useful. Their reports about the interest and behavioral reactions to various types of sound along with comments on tolerance for intense auditory stimulation is important.

It is frequently the case when a child, if stimulated enough to hear the sound, then he is also at the peak of his tolerance and a physically painful situation exists. This is similar to the pain demonstrated by a photophobic child when he is exposed to a bright light without accommodating dark glasses.

Valid assessment of hearing in the non-verbal child is extremely difficult. The audiologist spends considerable time varying his stimuli and environment so that such assessment will be as accurate as possible. The functional evaluation will use this information as a beginning toward assessment and usually as a goal. Usually is stressed here since there are many times when clinical impressions of sensory ability suggest better acuity than that reported possible by the evaluator. At these times it usually cannot be determined whether this is because of extreme sensory efficiency or the result of a phenomena where behavioral cues are used more readily because the child is also more highly motivated. In this area it must be stressed that the audiologists and ophthalmologists are aware of and consider these behavioral factors. In team evaluation, however, the appointment schedule dictates the information that will be available to any clinician before he sees the child.

There are many signs of auditory ability besides those mentioned above. A modulated vocal pattern is frequently significant. Many imitative sounds also may be assessed. One goal is frequently to teach production of these sounds with only auditory stimulus. This affords an analysis of the child's ability to hear your voice and match it with his own. It also allows for a more accurate assessment of motivation since there is direct intense contact at these times.

Care must be taken whenever evaluation of either visual or auditory modalities is taking place so that sensory cues are not given in another area. One sign of attention on the part of these children, is an ability to use all cues in the environment for information gathering. Responses, therefore, can be most deceiving to a person attempting any differential sensory evaluation.

Both visual and auditory functional evaluation are necessary to determine the role and sequence of materials presentation when programming is carried out. This information is also important for recommendations about appropriate teaching methodology. If a child's senses are obviously capable of receiving detailed information but do not react in such fashion careful consideration to determine why is needed.

As in vision, levels of reaction are important. A child using auditory ability for the purpose of orientation alone or as a mechanism for avoidance is much different from the one who strains each sensory area, auditory, visual, and tactile to understand the spoken word of the teacher.

For assessment of the auditory ability in a child, here and now, it is also important to have complete observational facilities. Many times when a clinician is working with a child, an observer can note several consistent times when auditory ability is suspected. These consistent responses to even the most gross cues can be organized and point to very definite features of the child previously overlooked. Auditory response to emotional tone is frequently a category reported by parents as used by the child. If anger is transmitted by an adult and received by the child through auditory channels, other information, therefore, should also be receivable by this modality.

As with sight, the use a person makes of amplification equipment is necessary information. Broken and lost hearing aids tell us much about the child's needs. The question is frequently resolved so that it is not so much one of possible sensory ability as it is how much can be used positively by the child. The experiencing of pleasant sensations is much more likely to encourage the use of an area than if all stimulation is negative.

Auditory functioning perhaps more than any other area offers evidence of perceptual problems beyond the sensory limitations. For this reason, early testing or pilot testing must be started at a level above the known threshold and below the established level of concept development. By doing this there is a minimization of the possibility that either of these factors, at least, will complicate the evaluation. Levels of ability may be determined in this functional assessment in both acuity and content. Pure assessment of the modality deals with acuity. This measurement is made under ideal conditions for the subject. The assumption in functional assessment is that, ideally, one person may respond better than another in a variety of situations even though the hearing "loss" is the same for each. Primarily, in this phase of the assessment, we are concerned with the person's awareness of a sound and not so much with its interpretation. Theoretically, there is the assumption that given ability to sense something, interpretation can be taught. It is recognized that such an assumption takes certain liberties about the nature of the learning process in the handicapped. For the present, however, let this assumption suffice. Application to perceptual analysis and concept development will not be considered here.

Methodology for evaluation of the ability relies a great deal on rapport, observational ability, time, and the accuracy of the information supplied by those accompanying the child along with previous records they bring. As has been indicated, the child who is aware of and positively oriented to the examiner will be willing to give more of himself and assessment will be simplified. Much is determined by the examiner's ability to creatively manipulate situations and present structure with controls for the many variables that could contaminate the results.

Frequently, it is relatively easy to demonstrate a high level of achievement by the child in sensory ability which is not predicted performance by parents, or others who know him well. Often this happens because of a particular set of circumstances, one of which is the unique situation between the evaluator, the child, and his parents. The combination of both parents being alone with him and giving their undivided attention is uncommon at least. In addition to this, there are other adults who seem to understand. These factors and others which frequently are unrecognizable make it possible to demonstrate significant capacities beyond the past results of others. This must be interpreted with caution. It does not always mean the child will progress in the manner which might be predicted by extrapolation. It also does not mean the same factors can be approximated in another facility. This type of approach only gives clues to methodology which may work. It frequently is a beginning direction that has never before been evident for this child. The words of caution here then are for recognition of the extreme effort which must be put forth to attain consistent results. This must also be applied to the complete and long term programming invariably necessary for the multiply handicapped child.

The individual sensory evaluation is to be carried out with attention to the conditions which assure measurement of each sense's capacity. Concurrently, it is also necessary to evaluate intersensory interaction. One modality nearly always has an effect on each of the others. This is especially so with handicapped persons. Careful observation of a visually handicapped person allows for good evidence that in addition to his visual ability he usually uses one or more additional modalities to supply extra and more detailed information or to verify suspected perceptions gained through this visual area.

The times when one modality is used to aid another leads to a hypothesis of sensory facilitation. At these times the supporting sensory area is used in a secondary manner to enhance or facilitate information gathering. Touch, smell, and taste are often combined for an infant to perceive new objects. The deaf-blind child may do the same thing through adulthood. Another example would place the visually handicapped person in situation of recognizing for social purposes. Suspicions from the visual sphere about whereabouts and identity are frequently verified by the sound of a person's voice. Certain other sounds such as footsteps and special habit patterns for that person also aid in this process.

The facilitative function of each sensory modality is important to assess. In this manner efficiency of the total person can be increased. Sometimes it is only possible to recognize this phenomenon in its entirety and often the child's use of these multiple processes is a cause of the apparent increase in functional ability over predicted acuity as mentioned earlier.

Intersensory facilitation is not only important to recognize; it is also important for the teacher to develop the child's capacity for use in all areas involved. Frequently the best approach is through meaningful and constant experiences in life. Personal and social activities are important to all children's development. Deprivation in this area is almost universal with the multiply handicapped.

There are frequently cases where an inhibitory process may be noted with a child's sensory abilities. Intersensory inhibition undoubtedly accounts for considerable decrease in children's functional ability. When this exists, there is a diminution of use in one sensory area. Functional ability may be considerably depressed in favor of another sensory area not normally used to gather such information. Non-handicapped children may prefer one area over another in the learning process. This is not as extreme a situation, however, as in the handicapped child and there is not such evidence for total reliance as seen in the multiply handicapped.

Frequently it is suspected the child has learned to rely on an inappropriate area because of a lack of direction in use of the more natural one. In this manner, a mild or moderate visual loss may first be magnified by disuse, and second, the reliance upon auditory or other sensory areas may further restrict its functional efficiency. This condition can become extreme in a multiply handicapped child. Frequently, it is caused by a teacher's complete frustration at the prospect of working with such an extreme combination of handicaps. Thus, she excessively reinforces any obtainable response and in effect teaches this specific use. When there is total lack of response in any area, this approach, of course, is quite acceptable. If, however, there has been inadequate evaluation and a sensory area has been diagnosed as entirely lacking when actually there is a measurable threshold, lack of attention to this may do permanent damage to the entire learning process.

SOCIALIZATION AND COMMUNICATION

An infant begins to explore his environment through all sensory areas early in life. His first occupations are undoubtedly confined to exploration of his immediate environment including the parts of his own body which protrude and are noticeable to his visual and tactile perception. Auditorially he receives sounds produced by the environment and himself. Soon his own vocal utterances are differentiated from other noises and repetitive sound patterns are made. This is one necessary step in the verbal communication process. Socialization and communication are seen here as interacting processes which need to take place simultaneously before development can occur. A recognition of others in proximity to the individual make possible the conditions which develop a need for communication. Another person recognized by the child presents a potential social situation. Mutual feelings recognized by each adds still another condition necessary--that of desire to interact. The act itself may be designated as an incident of communication. It could further be stated that if this process is for the purpose of interaction and is recognized and accepted by each with appropriate responses, then socialization exists. Some parts of communication may for certain purposes be separated from this. The communication of a need recognized by another but not responded to by that person might be classed as communication without the participating or interacting response.

The above statements are important considerations as introductory to the present section. These may be described in more detail as is needed but the basic rationale is here presented, as a need and method for the processes of communication and socialization. These should be considered at all levels of development. The complexity increases but reasons remain essentially the same.

Vocal utterances were suggested as being part of the communication process. With some children studied here several channels are eliminated from this situation and other channels must become primary areas for transmitting thought. Several must then be viewed as useful in communication. Verbal and auditory ability with appropriate symbolization is the most efficient and useful for transmitting ideas. This becomes especially necessary as these ideas become more abstract. There are numerous other techniques, however, which are commonly used for communication, hand signals, eye contact, total body movement are only a few. Many combinations of these also exist to make the entire process extremely complex.

Assessment of the total communication process must take cognizance of all these segments. The ability to receive information in any way and to produce signals must be carefully analyzed. This must then be combined with need and motivation or readiness so that appropriate weight may be given to each part of the process analyzed. Usually there is some repetitive behavior which may be used to form a base line for further, more complex analyses. Recognition of a familiar person or asking for specific things such as food make this possible. Basic areas may then be suggested as primary modalities used. Even body movements may be noted in such fashion that their occurrence under certain conditions invariably mean only one thing. An infant sucking on his hand at a certain time could always be a sign of desire for food. The same activity when elicited by the question "Are you hungry?" is an example of this now being labeled communication.

One must be continually aware of and able to describe these areas in their simplest form. Recognition of them may be difficult for one not accustomed to thinking in these terms. It is possible, however, and becomes a practical approach when multiply handicapped children are first observed.

With these children one must be particularly aware of each preferred modality and of any used in a secondary fashion. It is also necessary to become acquainted with those situations most commonly identified as examples of socialization. From these a beginning may be made to develop new ones and to analyze emerging techniques. It may also be possible to teach new processes or combinations of them not commonly used by the child.

The goal here as it is in all areas is not merely to evaluate a level; it is more for the purpose of starting with this level and using a knowledge of the child to create various approaches and assess these for their inclusion in recommendations for a treatment program. We need here to be especially concerned with the child's motivational system. If he has previously had all needs met then there may be little if any motivation to communicate. This is seen as one of the basic causes of children's lack of development in many areas. It is here that considerable change can frequently be demonstrated when children are worked with intensively in a diagnostic and therapeutic situation. Children who are allowed to vegetate in a non-stimulating environment and in one where no demands are made upon them to function as social and communicating persons will fixate at a level of minimum functioning. If possible, they will regress to a stage entirely comfortable to this inert situation and will have a lessening reason to leave it under any circumstance.

Functional ability in these areas is perhaps the most important goal for teacher, psychologist, and rehabilitation personnel. It is rather simple to list and expound upon important factors for consideration in promoting increased development for the group. It is more difficult, however, to be specific about one child and his needs. When the next step is taken, outlining a program and putting it in force, the task becomes infinitely more complex.

ANALYSIS OF INFORMATION

Thus far consideration has been given to the input phase of the child's systems for learning. His ability to make use of the information gathered through appropriate analysis and sorting tasks is also important. Finally, the results of these analyses lead to responses in the form of more appropriate behavior, appropriate at least in the thoughts of the child. If the sensory perceptions are distorted for any reason, the information coming to the child will be distorted and analysis and response will also be abnormal. This is precisely the case with multiply handicapped children whose handicaps occur in sensory areas relied upon for input of information.

Analysis of information depends upon many factors. A complete outline of these would take more space than is available here. Some are so obvious, however, with the type of children described in this project that they need enumeration. Experience is of course needed for any child to develop. The more extreme the handicap it may be said, the less experience usually offered the child. This is certainly the case for incidental experience. This makes a strong case for planned programs which stress individual experiences on all levels. Intense and constant meaningful stimuli are needed to provide this deposit of information which must then be maintained in a retrievable form. This deposit or memory needs to be intact and functioning for such information to be stored. If it can then be sorted and returned to the person's consciousness at appropriate times, a selection may be made by that person of the response he wishes to use. Retrieval then is also an important process and one which causes difficulty with many of our children.

The entire process of analysis must rely upon some form of response by the subject to supply information for the examiner. A lack of response severely limits conclusions which may be drawn. A multitude of responses in several areas which are behaviorally consistent on the other hand supply important evaluative data.

Most of the preceding statements should be recognizable as fairly acceptable learning theories. There has been considerable simplification and its application is not intended to be universal. It is primarily intended to serve as a structure for understanding the child considered in this book. As such, of course, it is open for considerable and probably justifiable criticism. Presently it is only recommended for this group because it seems to work. The few general points outlined here may be expanded in many directions and to an almost infinite degree. The extent to which this is done relies upon the reader's background and goals in reviewing this chapter.

Accurate analysis of responses is the crux of all educational and psychological evaluations. The examiner's ability to present information at the input level and observe the response or output gives him the data needed for such an analysis.

From this he may reach conclusions about the adequacies of the information and the reasons for responses at that level and at that time. Importance may be placed on the responses as the examiner sees fit. His training and theoretical biases will determine to some extent the approach taken and to an even greater extent the interpretation of the results. As was previously indicated this author's bias is primarily related to a developmental approach. It is believed that a child learns behavior and that various likes and dislikes along with capacities determine future developments. Specific materials and techniques then rely upon measurement in this frame of reference.

DEVELOPMENTAL ASSESSMENT

Many children reported in this study begin with very low functional ability in all areas. For these children actual measurement of concept development and manipulative thought processes is not relevant except as a basic level. There are other areas which do need measurement. They mostly fall in the theoretical framework as outlined above.

The framework of basic data collection is first applied to standard evaluation procedures of both intelligence and achievement. This includes assessment of the child's interest and motivation. It also compares these abilities to standardized information whenever this exists. From this, a rather adequate descriptive profile may be presented. After this, guesses may be made about program needs and prognoses for future development.

There are no standardized tests for this population. Because of the extreme diversity of the group it is quite unlikely that such scales will ever be developed. For the purpose of this chapter at least this is not seen as an insurmountable problem. A standardized test allows for comparative measurement of the tested person with previous test results given to others.

Variables are here controlled as they are deemed significant by the persons doing the standardization. This multiply handicapped population by its nature and definition varies in so many ways that an attempt at standardization would be impossible.

It is suggested here that another approach be used. Developmentally we may predict that certain sequences of behavior are commonly seen and are indicative of a stage of development. If this is the case, description may be made by these common sequences and each child compared on the various parameters of behavior. If one can accept this statement and the implications of it, there is a considerable quantity of material available for use. This would allow for description of a child's functioning ability in all areas as compared to known norms on children who are not handicapped. This type of analysis forces the child into the mold considered to be important by the entire population in his world at that time. It has possibilities for a more realistic description than has previously been available. It also supplies a foundation for outlining continuing steps in a sequence to be taught and a rationale for evaluating results.

The particular scales to be used in such a procedure depend upon the questions asked by the examiners and the areas he wants to assess. If number concept is important for instance, the examiner must determine whether he is interested in rote counting behavior by the child or some other development such as object-number relationship through 20.

The implications of a technique such as this eliminates many reasons for evaluating children which have been cherished by some. It does not consider a deprived intelligence quotient as being necessary for a program. The behavioral description in this case is considered an adequate starting place with goals measured by further behavioral statements established in advance. There is also no allowance for a definite step-by-step evaluation protocol available for each child as he comes through the clinic. This is also a frightening fact to those whose needs for a definite procedure and diagnosis supercede their need for valid and meaningful results. It is certainly not suggested here that some instinctual process be used in determining behavior to be sampled and described. Significant groupings of the behavior are somewhat outlined by this entire document. The interdisciplinary dependency for information and conclusions almost by itself suggests broad categories for consideration.

The physical growth characteristics of the child combined with any abnormality noted at present or which have been factors in the past is an important area for measurement. The general level of communication ability is also important. This of course involves the input process as well as an effective system of response. The effect of environmental factors is an extremely important area of consideration. Environment here includes physical and social and is especially concerned with the child's reaction to it. Finally the area of psychoeducational adjustment and ability must be adequately measured before the picture can be complete.

If a professional representation of the fields represented by these areas can develop a capacity to communicate and join in defining and attacking problems demonstrated by these multiply handicapped children, then much of the concern about evaluation and programming will be drastically decreased.

Readers familiar with pertinent literature in the field of psychological evaluation or educational practice will recognize many person's ideas and it is hoped some consistency in theoretical approach. Much of this is well documented in summary sources. Since this is not intended as a chapter on such theoretical approaches reviews of the literature were not felt to be appropriate. A bibliography has been appended, however, to allow the reader some starting point for further study of the extremely challenging and complex task of psychoeducational assessment and programming.

SPEECH AND LANGUAGE EVALUATION

Scott Curtis, Ph.D.

Oral communication is a relatively complex process consisting of three interrelated but distinct components: speech, language, and supplementary behavior, such as gesture, which enhances or substitutes for the usual speech and language processes. The interrelatedness of these three aspects of the total oral communication process can be observed in the struggles of the young child as he tries to make himself understood. In the event that the child's first effort to present his idea or feeling is not clearly received by his listener, he may alternately modify any of the three components of his communication system for effect. He may alter his speech system by talking louder, or more slowly or with more precise articulation. He may alter his language system by using different words from his vocabulary of synonyms or he may try more straightforward grammatical constructions or more novel syntactic patterns. He may also utilize supplementary communication through gestures, crying, pantomime, or even direct physical action to make his point. (Writing and drawing may be thought of as supplementary [or compensatory] when the usual mode of communication in a given circumstance is oral.)

Although the order with which these three aspects of the communication system are varied in the effort to communicate and the competency to use each may vary from person to person, all are available to the normal speaker from an early age. It is the interrelatedness of these three systems and their interchangeability for total effect within the communication process that makes verbal behavior a flexible and useful tool as well as an artistic and pleasurable process.

This interchangeability of oral communication modes is ordinarily one of the great compensatory skills of the human being. It allows him to overcome a weakness in one area of function through substitution and perhaps excessive development of another. However, the deaf-blind child with his severe and numerous associated problems has often been found to lack functional adequacy in any of these systems. This is not only his most fundamental and damaging problem as a communicator but also the characteristic which makes his a particularly unique evaluation problem for the speech and language clinician as well as many members of the evaluation team whose traditional tests are based on verbal interchange.

It is also this apparent interrelatedness or "interchangeability for effect" that belies the complex independent aspects of speech, language, and supplementary oral communication modes. When the communication skill of the individual is defective, it is the task of the examiner not only to describe the over-all interpersonal disability but also to assess the relative functional efficiency of the various intrapersonal systems which constitute the oral communication process. To do this the examiner must work from an artificial construct which further fragmentizes speech, language, and related communicative behavior.

The examination of the speech system is concerned with the child's ability to produce vocal tone and modify it through resonance and articulation in order to create intelligible (but not necessarily meaningful) phonemes and phoneme combinations. The language appraisal is concerned with the analysis of the child's ability to store and manipulate meaningful verbal units such as morphemes, words, sentences and grammatical constructions, i.e., information with which to think and feel. Appraisal of supplementary communication skills is particularly important to those with communication disorders although some such skills are used by all speakers; it is concerned with the role of gesture, pantomime and action as means of communicating as well as nonverbal means of thinking and feeling and expressing emotion. In the case of the deaf-blind there are some specifically trained compensatory systems such as the vibration method and tactile communication skills which must be particularly explored as supplementary to speech and language.

The following two units, "The Speech System" and "The Language System," are presented to identify for the reader those capacities and skills which are customarily analyzed in the description of an oral communication system. The third unit, "Supplementary Communication Analysis," describes some of the patterns of examination used with the severely handicapped children seen by this team. Although a few of the children in this group have had sufficient speech and language to be reviewed through a typical protocol, the largest portion of the group have been more appropriately examined for the supplementary communication patterns described in the final portion of the chapter.

THE SPEECH SYSTEM

There are two general characteristics upon which the overall efficiency of the speech system can be judged: fluency and intelligibility. Both of these speech characteristics are estimated by listener judgment in a somewhat subjective manner. Both are determined more organically by the functional integrity of the respiratory, phonatory, articulatory, and resonating physical speech mechanisms which are in turn regulated, timed and sequenced by accessory speech skills of the sensory and central speech-language system such as auditory discrimination, memory span, etc.

Fluency. Fluency is determined by listening to a sample of continuous speech. Fluency is good when the pattern of speech is regular, rhythmical, varied within reasonable limits, and shows a continuous forward movement of the ideas being presented by the speaker. Fluency may fail due to erratic and irregular movements of the speech muscular system (even though the physical and psychological mechanisms of oral communication may independently be judged as satisfactory) or redundancy of ideas and word repetition.

Among the reasons for failure in fluency are:

1. a poorly integrated neuromuscular system for speech

2. reaction to generalized or momentary and specific psychological pressures

3. word finding problems

Intelligibility. The ultimate determination of the efficiency of the speech system, bearing in mind that speech is distinct from language, is intelligibility. The determination of intelligibility consists of the calculation of the percentage of sounds, words, sentences or larger speech units which can be correctly identified by specific listeners under a given set of conditions. In interviews with the parent, teacher, caseworker, and other examiners, the speech pathologist must estimate the number of words which the child uses in daily life and the percentage of these that are intelligible to each group.

Such appraisal is also important because it serves as a reminder to the examiner that the various parts of the speech system which are to be examined minutely may not give a clear picture of the over-all speech output and because discrepancies in intelligibility under various conditions may give clues to reasons for communicative problems.

Respiration. The energy source for the speech process is the breath stream in its expiratory phase. In a general sense, the majority of speech disorders cannot be traced to a respiratory causal factor. Yet, in some instances--particularly those in which gross neuromuscular abnormalities are present, an articulatory or vocal dysfunction can be aggravated by either respiratory insufficiency or an arrhythmical pattern of respiration which breaks up the customary fluency patterns of speech.

A respiratory analysis calls for the appraisal of the following air flow characteristics:

1. volume
2. pressure

3. direction
4. duration
5. controlled interruption
6. muscle pattern for accomplishment
7. volume cost per speech unit

In general, the child should be able to insufflate sufficient amounts of air to produce at least a sentence which might be said by a child his age. He should be able to breathe controlled amounts of air at will and on command change from inhalation to exhalation. He should be able to control the flow of air through the oral and nasal cavities as well as to interrupt the flow of air with the articulation and resonance muscles without undue strain. He should show smooth coordinated muscular activity in the facial, neck, throacic and abdominal areas as he breathes vegetatively and with conscious control. The effectiveness of the respiration process should be noted under various degrees of emotional pressure.

Especial attention should be paid to the possibility of physiological impedances to respiration whether these be diseases which reflect themselves in the total organizmic functioning of the child or specific obstruction of the respiratory pathway.

Phonation. Voice production is accomplished by the modification of the breath stream as it passes out of the lungs during forced exhalation. As exhalation occurs, the vocal folds are approximated and caused to vibrate. This vibration results in an audible tone of a periodic and complex wave form which in normal speech production is present at all vowels and approximately 60 percent of the consonants. During continuous speech one intermittently uses voiced and voiceless phonemes (speech sounds). It is, of course, possible to produce intelligible speech without voice as in the case of whispering--but normal speech requires vocal activity.

The most primitive level of vocal behavior is seen in the production of non-speech sounds such as crying, laughing and coughing. The presence of voice during these activities is generally considered a positive finding indicating that vocalization is possible whether or not it is being used in speech.

When the child is able to produce a purposefully mounted vocal tone, it may be assessed in each of the following categories:

1. pitch
2. loudness
3. quality
4. duration
5. variability
6. appropriateness to intent

It is a positive finding when the child is able to vary his pitch and loudness in imitation of the examiner. Further skill is shown by the spontaneous use of variation in pitch and/or loudness during vocal production. Voice quality (timber) is judged with respect to the appropriateness of the voice to the age and sex of the child. The ability to sustain sound over time and to start and stop sound production at will or on command is also an important skill to be explored in severely handicapped children.

A stringent test of the efficiency of the vocal mechanism is whether or not the child has learned that some, but not all, the sounds are voiced and that he can use voice on only those sounds which call for it. If he has this skill on the majority of sounds, it is advantageous for him.

When the speech pathologist isolates and describes abnormal patterns in the vocal system he is interested to relate these findings to the team of examiners--especially those in neurology, laryngology, psychology and audiology, since within these specialities lie further information on the causes of vocal malfunction.

Articulatory system. When the air stream passes through the oral cavity during forced exhalation, variations in position and movement patterns of the articulating organs (the mandible, lips and tongue), result in a fricative, explosive or resonant modulation of the air stream which is identifiable as speech sounds (phonemes).

There are numerous schemata for organizing the results of an articulation profile. One of the most common is the comparison of a child's articulatory ability with the normal expectations for his age level. Another is to arrange the results in terms of muscular groups and place of articulation to determine loss or disuse of specific action patterns of the muscles. Another is to compare voiced and voiceless phoneme production to assist in the appraisal of the vocal-articulatory interaction and fluency. Another is to consider the classic phonetic families in order to gain basic information on the articulation process scientifically.

For our purposes with this population it seems most appropriate to work from the following paradigm (Table I). When a child produces a forceful exhalation through a relatively unrestricted oral tract a fundamentally simple consonant occurs /h/. When this same action pattern is followed with voice added, the unrestricted and unstressed vowel / / occurs. From these, through the shaping and positioning of the jaw, lips, tongue, and palate the remainder of the 40 commonly used speech sounds are produced.

TABLE I

Recommended Sequence for Appraisal of Articulatory Function

Group	Voiceless Phoneme	Voiced Phoneme	Action
1			Exhalation
2			Round and Protrude Lips Open and Close Lips Bite Lip Protrude Tongue
3			Elevate Tongue tip
4			Round and Protrude Lips Close Jaw
5			Complex Movement
6		Vowels	

Certain of the sounds produced by this shaping process have the advantage of being visible and externally manipulable by the examiner. Others lack this visibility and manipulability and require auditory cues for stimulation.

The sounds of group one (Table I) are tested first because they are least complex in small muscle movement and are essentially biomechanical non-speech actions. The sounds of group two represent those of our English phonemes which can be produced or aided by external manipulation of the lips by the examiner. The sounds of group three are produced by elevating the tip of the tongue which can be partially assisted by the examiner in some cooperative children when the mouth is open. The lip portion of the sounds in group four are manipulable but the crucial tongue position to each sound can only be obtained by auditory stimulation since the jaw is closed during their production. Consequently, they and the sounds of group five which are complex back tongue sounds are tested last to reduce frustration and failure experiences during the examination. The vowels are tested last due to their close acoustic and motor similarity which requires skillful auditory and tactile discrimination.

The three phonemes which are normally nasal /m/, /n/ and / / are tested as part of the resonance system.

Resonant system. It is difficult to separate the resonant speech system from the articulatory and vocal systems since obviously the oral cavity is a resonator for all the voiced phonemes and since vocal quality is partially determined by the action of the resonance system on the fundamental and overtone structure of the sound produced in phonation.

The critical question of the resonance examination is the determination of the effectiveness of the palate as a gate between the oral and nasal cavities. Absence of palatal tissue or loss of function such that elevation and stricture is impaired causes the normally oral tones of speech to appear nasalized. Conversely, clogging of the nasal cavity and/or constant stricture of the palatal aperture causes denasal speech.

Normally the palatal sphincter is largely closed during all speech except the production of the phonemes /m/, /n/ and / /. Usually, the examiner can hear whether or not nasal tone is being initiated and terminated appropriately as the client speaks or cries or laughs.

With the mouth open and the head tilted back it is possible to observe some palatal function and appearance with cooperative children.

When resonance problems are observed in the speech, team consultation with the pediatrician, laryngologist and audiologist are usually indicated to determine a causal base.

Accessory Speech Skills. A major portion of the speech analysis consists not only of the foregoing description of speech output, but also an appraisal of certain broader functional speech capacities. These are:

1. Auditory Memory Span. The ability to recall words, sounds, phrases, sentences.
2. Auditory Phonetic Discrimination. The ability to recognize the difference between sounds and words especially when they are similar.
3. Vocal Phonics. The ability to synthesize a series of phonemes into a word.
4. Vocal Analysis. The ability to break a word into its syllables or phonemes.
5. Vegetative Muscular Skills. The ability to nurse, suck, chew, swallow, and rapidly or rhythmically repeat simple muscular patterns (diadochokinesis).

6. Tactile, kinesthetic, and proprioceptive discrimination skills (stereognosis and haptic skills).

7. Stimulability. The skill for imitating speech sounds.

8. The Speech Concept. The apparent understanding of the nature and processes of the speech act.

9. Consistency. The variation of correctness and incorrectness of speech function in varied circumstances.

Trial Therapy. Perhaps the most crucial part of the speech examination procedure is the estimation of how well the child responds to some of the clinical approaches to speech development or remediation. Among the approaches which are applied to the child in approximate order are:

1. Stimulation--the bombardment of the child with a sound until it appears in his speech

2. Phonetic Placement--the manipulation of the speech organs until a sound is correctly produced

3. Moto-kinesthetic--a system for tactile suggestion and stimulation for continuous speech

4. Chewing Approach--the modification of this vegetative biological process into speech

5. Parallel Talk--initiation of speech through verbalization of the behavioral interaction of the child and clinician

6. Variation--production of one sound made through the variation of another which is available to the child and is closely related acoustically oanatomically

7. Imitation--the stimulus-response-reward paradigm

8. Frustration (activation)--the demand for speech is made subtly by removing frustrations or introducing a reward as speech or sound is produced in a behavior-reward situation

THE LANGUAGE SYSTEM

The language system is often considered to be more complex than the speech system not only because many of its machinations are internal and, therefore, can only be inferred, but also because of the almost indistinguishable and inseparable relationship language bears to intelligence and conceptual skills. Perhaps because of this complexity or perhaps standing alone and contributing to this complexity is the relative unavailability of a standardized or formal test battery for appraising language skills in the handicapped population.

Within recent years the relationship between peripheral speech disorders and the total verbal system has become increasingly important to the speech pathologist. The acquisition and retention of phonetic and vocal skills appears to be partially a function of the integrity of the inner linguistic system just as the learning of a bit of general information is thought by the psychologist to be a function of the inner intellectual and conceptual systems.

Although the development of more refined clinical tools is a continuing concern of the professional worker, an equally important concern is the most efficient display of information obtained from currently available formal and informal tests. The information which we obtain from a series of clinical operations is currently displayed in one of four modular systems.

Developmental Model. This approach bears some generic relationship to the mode of display used in intelligence testing. Norms are accumulated by age or grade for a wide range of language skills and the performance of the handicapped child is then rated as developed to a given level of efficiency in relation to his chronological peers. An example of this approach is the Meecham Language Development Scale.

Communication Model. Another frame of reference is concerned with the transmission of information through the child's sensory neuromuscular system with the information obtained in examination being displayed in terms of sensory receptive, inner processing and motor expressive categories. A recent elaborated example of this display system is the ITPA.

Handicap Model. In some instances the child is not particularly compared to his peers nor is he examined with respect to the stations along his information processing pathway. He is instead appraised for his verbal skills which are compared to his own personal level of function in other systems of nonverbal behavior such as social, intellectual, motor, and/or educational ability. He is compared with himself. The double scoring technique for administration of the Vineland Social Maturity Scale is an example of this display pattern.

Linguistic Model. The clinical display which is probably least used in this linguistic paradigm although it is one of the most frequently explored experimentally. The assumption of this model is that one of the factors which limits verbal performance is the nature of language itself. An example of this type of testing is the ability of children described by Berko to use rules of grammar in an abstract way before they have been learned formally.

Although there are enormous complexities involved in the detailed specification of language and language learning as evidenced by the vast literature on the subject, it is necessary to be somewhat concise with reference to working linguistic models. For that reason, we concentrate on three attributes of language:

1. Symbols
2. Referents
3. Rules

The symbols are utterances that the child seems to sense or try to produce. They may or may not be "real" words or sounds used in the vocal acts of normal speakers.

The referents are objects, events or emotions the child can sense or perform or demonstrate.

The rules are those of the system--the cultural system for communication used by English speaking people. Grammar is the most readily noted example. Syntax is another. Tenses and pluralizations are others.

It should be obvious to those who have dealt with severely handicapped children that the child will acquire referents, symbols and rules in approximately that order as he develops and that the handicapped child will have those three attributes of language with decreasing abundance in that same order.

It is appropriate in appraising the functional efficiency of the expressive language system, to assess the working capability of each of these three attributes. This ought to be especially true in appraising a defective language system since the purpose of such appraisals is not only to determine the extent of the inefficiency but also the areas of deficiency which cause the overall output to appear defective due to their malfunction.

Each of these four models seem to have merit and may well be used to display the data found in a single examination. It is possible that in a language appraisal many examiners perform the same operations but classify the data obtained in different ways. Indeed these models may be thought of as displays for the information obtained in the examination, with each more or less suitable for relaying our test data to members of other professions. One set of real data seems to have greater meaning to the educator if displayed in terms of developmental model while the psychologist may make better use of the same information if given to him in the form of the communication model. Physicians may prefer the handicap model while the experimenter learns much from the linguistic display.

Because these models are only hypothetical constructions which attempt to bring concreteness and specificity to the "gestalt" of the language process, they are not necessarily operational.

The measurement of these assumed segments of the language system is at the moment an inexact process which relies heavily on the built-in standards and experiences of the examiner.

The formal tests which have been developed to appraise language capacity and usage are not many in number and are as a rule too specific with respect to age, type of disability and level of applicability to be of much value in the clinical examination of the deaf-blind child.

For this reason, the examination process has consisted largely of an after-the-fact categorization of capacities, skills, or functions which seem to describe the ability of the child to convey meaning.

Meaningfulness. Just as intelligibility is an over-all estimate of the efficiency of the speech system, so meaningfulness is a general criteria by which language efficiency is judged. In addition to the general estimation of the ability to communicate ideas and feelings, the examiner must also determine specific areas of competency and disability for parts of the language system in an effort to localize problems for diagnostic purposes, when the ability to convey meaning is less than satisfactory.

Meaning may be conveyed by or to the subject through five methods: orally through speech, by gesture and facial expression, by writing and drawing, through direct action and in the special case of deaf-blind children through compensatory communication methods such as braille and tactile systems.

There is, unfortunately, no absolute index of the ability to behave or especially to speak meaningfully. The decision that a child is a poor purveyor of meaning is a subjective judgment which must be made by the examiner on the basis of his exposure to normal children and children with handicaps similar to that of the child in question. And, in fact, the decision must be qualified in several ways. The decision must reflect the ability to handle meaning at the receptive, central and expressive levels. It must take into account the limitations imposed by the sensory, central and motor disabilities of the child. It must contrast the ability to convey feelings and attitudes with intellectual or factual data transmission.

The following are characteristics of the language system which can be examined for or observed in the individual speaker. Although this particular list may not necessarily be thought of as a model in that it purports to be a complete description of the system, it is employed because the items are tangibles of the system.

1. Storage: The number of words and verbal concepts a child contains.

2. Semanticity: The appropriateness of the words known to their referents in the real world.

3. Syntactic Manipulation: The ability to order, organize and re-organize words in the storage system.

4. Generation: The ability to activate and use the verbal system without direct, immediate outside stimulation (spontaneity).

5. Association (Conceptualization): The skill for relating words of similar meaning and interchanging like words in conceptual patterns.

6. Inhibition: Ability to constrain immediate repetition of stimulus words, to control redundancy, and to block the flow of words not needed or appropriate at the moment (suppression).

7. Acquisition: The ability to learn and retain verbal symbols, systems, and their referents.

8. Supplementation: The ability to use speech functions (stress, pause, inflection, etc.) to enrich meaning.

9. Acculturation: Apparent knowledge of and use of cultural patterns of word usage.

10. Redundancy: The ability to use words not called for by the mere transmission of information, in such a way as to improve the flavor of communication as normal or superior speakers do.

11. Simultaneity: The ability to use language concurrently with other activities.

12. Grammatism: The use of words in several grammatical forms, i.e., the ability to use roots as building blocks for expressing tense, plurality, etc.

13. Discharge: The use of language for emotional purposes.

14. Interchangeability: The ability to use several behavior modes including language for the same purpose.

Trial Therapy. Superficially the activities apparent in efforts to modify language may not appear too different from trial speech therapy and/or general educational or psychotherapeutic processes. This is because all of these processes are similar. Speech is a vehicle for language learning and learning is learning--to a point.

There are distinctions though. In speech therapy, the focus is on the ability to produce the sounds of our language and combine terms for intelligibility while in language learning the emphasis is on meaning (the passing of information even if intelligibility is poor or perhaps even in the absence of speech as generally used).

There are two distinctions to be made between language learning and learning generally. The first is that language learning to be complete requires two other learning experiences conjunctively--the learning of a set of referents and a set of rules. In this sense, language learning is both complex as opposed to simple learning and abstract in that it requires associations.

The second peculiarity of language learning also relates to the matter of language not being isolated learning, but in a different way. The problem lies in the apparent fact that there are two kinds of learning for language: learning by acquisition and learning by teaching. Ordinarily, it is to the normal child's great benefit that he can acquire the symbols, referents and rules of language in a natural way through life experience. Later these three areas are expanded through formal teaching in the school but, fortunately, acquired language is so much a part of the child that neither the best nor worst teaching can often destroy what is his. Unfortunately, the deaf-blind child does not acquire language. It must be taught to him and, since it is complex and abstract learning, it is easily disrupted, confused and destroyed by those same natural experiences which are of great advantage to the normal child.

The majority of children seen by this evaluation team cannot be expected to acquire speech and/or language through either natural developmental means nor through the usual techniques of education and therapy applied by teachers of the deaf, speech pathologists or other special educators. This is not to imply that deaf-blind children cannot be taught compensatory communication methods nor does it suggest that some such children do not have speech and language. The implication is that more basic problems are current.

One of the most frequent observations from interviews and reports on the deaf-blind child is the notion that "if he could only be taught to communicate, he could be taught so many other things." Perhaps at a very early age this is a good attitude and suggests a proper starting point upon which to focus educational planning--perhaps. However, when the child is five or ten or even twelve years old we have heard the same concern voiced for the child. At these ages the view is not so reasonable. The limited and awkward avenues of communication available to the child, primarily tactile, must be utilized to foster any learning--including the learning of language.

Those whose task it is to teach language to the child should be cautious of the above point of view. One should not assume that language learning is outside the paradigm of learning generally. If a child has learned or apparently can be taught little or nothing with great promise of success, one of the last things to expect him to learn is normal communication. The motor and sensory discriminations as well as the immediate biological reward or relief for the accomplishment of "blowing a /p/ sound" into the hand of a teacher are well outside the skills and rewards for feeding oneself. And yet some parents as well as professionals will still overlook the obvious, speech and language is a learned process requiring vastly more complex and refined sensory and motor acts than many other skills which the child has not learned.

It would not be quite correct to say that trial therapy for language is not conducted during the evaluation. Therapy or education for language is an effort to increase the child's ability to build associations between symbols and referents and to utilize these in the system of rules (of the English language culture) and this is certainly attempted with every child at his level. However, because of the extreme impairment of the vast majority of the children seen by this team, the question of analyzing the possible values of various didactic systems for language learning such as those of educators of the deaf, teachers of the brain injured, methods for the retarded and methods for teaching language fundamentals and arts to the normal child are generally too far advanced to be relevant.

Though some time is always devoted by the team to the question of whether or not the child can learn language, more time is centered on whether or not the child can learn. For this reason, the following unit on Supplementary Communication Potential is included.

SUPPLEMENTARY COMMUNICATION ANALYSIS

There are two categories of compensatory communication skills which are available to the deaf-blind child. One group consists of desirable formally learned patterns of alternate communication such as a spelling glove, the use of the tactile manual alphabet, or communication through the vibration method or the teletouch machine. Other compensatory communication patterns are not so easily evaluated as good or bad. These are the patterns of gesture and vocalization which the child acquires "spontaneously." They are undesirable to some extent because they are not culturally acceptable and do not allow the child free exchange with all whom he contacts, yet there is a tendency to too quickly dismiss these self-acquired skills and ignore the obviously important fact that the child has shown through them that he can communicate and is in some ways creative enough to develop his own means for self-expression.

The task of the examiner is, with respect to observable compensatory communication skills, to explore the patterns utilized for clues as to the level of internal concept being conveyed and the system whose functions are demonstrated by the pattern.

Among the characteristics which seem to relate to the child's potential for communication are the following:

1. Age of onset of the multiple sensory disability.
2. The severity of the vision and hearing loss.
3. Concomitant problems, especially mental retardation, brain injury, emotional disturbance and motor disorders.
4. Age at which evaluation and treatment for medical, psychological, educational and communication problems is commenced.
5. The ability of the family to deal with the problem, emotionally, intellectually, and financially.
6. Regularity of contact with an experienced and competent teacher of deaf-blind.

A problem which cannot be resolved by the following remarks nevertheless, must be commented upon at this point. Although the children seen by this team are probably best labeled as deaf-blind children, they are not well described by this name. Deafness and blindness imply a severe or complete loss of sensory receptive ability. These children do often have such problems but to varying degrees. However, they also have aberrations of visual and auditory function which are far more troublesome to them and to the examiners, than the degree of sensory loss.

A further problem develops when trying to adopt the term multiply handicapped for this group of children. This term is not suitable either. Since there are numerous groups of multiply handicapped children who are not hampered in any sensory avenue, and who are in many ways as dissimilar to this group as they are similar.

The children can in general be described as having a marked degree of visual and auditory sensitivity loss as well as complications of visual and auditory function, encumbered by one or more of the following problems: gross motor disability, the brain injury syndrome, emotional disturbance, social and educational and environmental disadvantages, and chronic health problems.

From this melange of disabilities, two emerge as special problems for the speech pathologist. The first is the problem of planning for the development of communication skills within the framework of social and educational and family problems which surround the child. Many of the children cannot engage in social activities which might foster the development of communication; neither can most of the children expect to have the advantage of an excellent special teacher in a good special school; nor can one expect to teach the parent to be all things to his child.

The second aspect of the multiple disability which causes particular problems in evaluation and diagnosis is that of distinguishing between emotional and neurological bases for the distorted behavior patterns of the children. This is not a problem which is soluable by any one member of the team and in many instances not by the team collectively. But it is vitally important in establishing primary contact for communication. The operational distinction which may or may not ultimately be related to the emotional-neurological dichotomy is: does the child attempt to interact but show confusion and frustration during failures or does he seem unwilling to communicate and establish interpersonal contact whether or not he is successful.

An attempt to establish contact with the child for purposes of establishing a relationship within which communication can take root has been the prime function of the speech pathologist on the team. A larger description of some of the details of this process over the total visit of the child to the clinic has been printed elsewhere (Curtis, 1965). However, a summary showing the type of categories open for examination and some of the specific questions explored by the examiner are reproduced here and organized into categories roughly following the "communication model" referred to earlier.

I. Receptive System

A. Tactile

1. Does the child respond to passive holding and handling?
2. Can he be guided by simple touch command through gross motor patterns (e.g., walking)?
3. Can his attention be held at table activities (small muscle activities) through tactile stimulation?
4. Can he discriminate between people by touch?
5. After holding several objects, will he show preference for one or the other?
6. Does he show awareness to unfamiliar tactile stimulation (e.g., glue on the fingers)?

7. Does he respond differently to tactile stimulation when it is accompanied by voice or noise, in the light as opposed to a dark room?
8. Does he respond to differences in temperature?
9. Can he be conditioned to tactile rewards?

B. Auditory

1. Does the child smile, withdraw, or cease activity when voice is presented to him?
2. Does he show gross differential behavior to sharp command, as opposed to soothing pleasantries?
3. Can he be awakened by sounds?
4. Does he respond to nonvocalized sounds?
5. Does he follow simple verbal commands?
6. Does he listen (i.e., actively attend to sound)?
7. Does he respond differently to sound in a dark room as opposed to a lighted room, when being held as opposed to being alone?
8. Does he cover his ears when in the presence of noise or speech?
9. Does he react to amplification of sounds which he himself has made?
10. Can he be conditioned to audible rewards?

C. Visual

1. Is his behavior different in the dark as opposed to a lighted room?
2. In the above situations, does his behavior differ when an adult is present, when the adult talks to him, holds him?
3. Does he hold objects up to his eyes when examining them?
4. Does he respond to flickering lights?
5. Can he be conditioned to visual rewards?

II. Expressive System

A. Gross Motor

1. Does he attempt to free himself from restraint?
2. Does he "force" things when he knows they should move but when they are held firm against his efforts to move them?
3. Will he try to free himself from unfamiliar stimuli (e.g., tape on his arm)?
4. Does he direct people by holding or touching them?
5. Is he curious about unfamiliar tactile stimuli (e.g., sandpaper)?
6. Does he bite, kick or abuse himself or others as a means of social control or contact?

B. Primitive Vocal

1. Is there a preponderance of oral to nasal tone as in normal speakers?
2. What are the acoustic characteristics of his cry?
3. Will he produce sounds in order to get a reward?
4. Does he vocalize randomly when frustrated?
5. What percentage of the time does he vocalize under different daily test conditions?
6. Is his sound pattern predominantly vowel-like or consonant-like?
7. Is his sound pattern timed with pauses as in speech or biological necessity?
8. Will he modify produced sounds in order to continue to receive a reward?
9. Does he have repetitive vocal patterns in reaction to frustration, to pleasure?
10. Does he make ritualistic nonspeech sound patterns during activity, at rest?

C. Verbal

1. If the child is at this level, a customary verbal analysis or speech evaluation protocol can be followed.

III. Central System

1. Has the child learned anything? Can he feed himself, is he toilet trained?
2. Can he remember where objects are kept or placed once he has been shown?
3. Does he show pleasure?
4. Does he seem to converse with himself?
5. When he has been put through a simple series of tasks, does he know when one step is left out?
6. When his usual means of manipulating his environment are cut off, does he adopt other means?
7. Does he react to incongruities (e.g., a chair on top of a table)?
8. Is he aware of danger?

IV. Interaction System

1. Can he initiate tactile, auditory, or visual acts or patterns presented to him?
2. Can he be instructed to perform nonverbal tasks?
3. Can he be instructed by tactile demonstration to perform vocal tasks?
4. Can he be conditioned to make different vocal responses to different tactile cues, to different auditory cues?

5. In your estimation, is the time period between a stimulus and a response sufficiently great or otherwise indicated to be available to the child centrally for consideration or is the process conducted with the speed and other apparent indications of signal behavior?
6. Is the child's interaction system primarily self-contained, that is, does he prefer to handle, touch, caress, bite and manipulate himself rather than to manipulate others or be manipulated by them?
7. Does he respond to passive motor-tactile manipulation patterns?

V. Referential System

A. Environmental Opportunity

1. Is he in a constant or varied environment?
2. How much time is spent regularly in an effort to teach or train him?
3. Whom does he come in contact with regularly and how does he interact?

B. Motivational

1. Does he explore people and show interest in them?
2. Does he explore rooms?
3. Does he persevere in his exploratory acts?
4. Is his exploration stopped by himself or others?
5. Is he interested in discoveries made during exploration?
6. What does he do when deprived of all stimulation?

C. Personal

1. Is he generally apathetic, withdrawn, asocial, unstimulable? Can the pattern be controlled?
2. Is he generally hyperactive, destructive, short of attention span? Can the pattern be controlled?

D. Sensory

1. A summary of through what sensory avenues and to what degree in each the child may be stimulated.

E. Expressive

1. A summary of what expressive motor abilities are available to him for the modification and control of his environment.

Trial Activation Therapy. Perhaps the most important or significant realization which has been strengthened during the process of testing these severely visually and auditorily handicapped children is the obviation of a difference between educating the child, i.e., teaching him something, and the more fundamental problem of establishing contact with him. Two groups of children whom we have examined have responded to the didactic or educational approach. A small group of children have come to the examination with considerable skill in interpersonal communication through the vibration method. Another group, having some residual hearing and vision, has arrived for testing with some interpersonal verbal skills which appear to have been taught through the didactic methods of educators of deaf.

A third group of children enters the examination with no appreciable communication skill. These children have sometimes been exposed to the above didactic approaches and others have vegetated with essentially no attempt to educate, stimulate or relate. This group of children constitutes the largest problem of the speech pathologist. Before this group can be educated in the most rudimentary speech or language skills--they must be either activated or controlled. Thus a great portion of examination time is devoted to determination of the means to activate not only speech and language but interpersonal communication on the simple contact level, i.e., establishing contact. The processes of activating or controlling interpersonal contact and verbal behavior is neither easily described nor carried out. The process involves seven steps:

1. The isolation of the subject so that all stimulation and contact can be controlled as much as possible.

2. Observation of the child's general behavior pattern and the determination of stimuli which cause cessation of behavior or changes in behavioral patterns. Peculiarly enough, these stimuli are usually auditory or visual.

3. The identification of objects or referents for which the child has an affinity.

4. The identification of stimuli which the child can produce. That is, those behaviors which are potentially symbols.

5. The development of association between the experimenters' stimulus, the child's object oriented behavior, and the child's potential symbolic stimulus.

6. Determination of a motivational and reward system to use for modifying the current symbol-referent relationships of the child into more culturally acceptable ones or for building relationships between symbols and referents which the child has but which are not as yet associated.

7. The reward encouragement and enhancement of the relationship.

This covert process is repeated and modified until the client is tolerant of overt manipulation and hopefully eventually to a more direct learning or didactic situation.

The Decision Making Process and Reporting to the Team. Since there is a certain implication throughout the above report that the majority of children seen by the speech pathologist have neither speech nor language to any appreciable degree, one may wonder about the role of the speech pathologist as a member of a team evaluating deaf-blind children. It would be pedantic to attempt to place priorities on the schedule of operations and decisions the speech pathologist must accomplish to participate fully in the team evaluation. Consequently the following is merely a list, with no implication of primacy by order, of the operations performed by a speech pathologist on one such team.

1. Interaction with other members of the team during the examination process for the purpose of collecting and focusing the results of their findings on the communication aspect of the child's problems.

2. Description of the functional integrity of the peripheral speech mechanism of the child at a biological level to indicate the extent to which the system could mount and sustain a series of phonemes, all other systems being equal to the task of communicating.

3. Exploration of the child's apparent information content to determine whether or not the level of abstract ability and associative behavior is sufficient to warrant the assumption that he could associate symbols with referents if the sensory handicap could be overcome.

4. Appraisal of the child's malleability, or at higher levels, his educability as a determinant of the processes through which speech or language training might be undertaken.

5. Reporting to the team on those aspects of the child's communication skills or patterns of pathologies which might assist in the determination of some of the causes of the fundamental problems of the child.

6. The determination of specific recommendations to parents indicating to them what they should stop doing, what they are doing well and should continue to do and what they have not been doing that they ought to begin in order to enhance oral communication.

7. Clarification for the team and parents of the relative urgency of treatment for communication problems relative to other needs of the child.

8. Determination of the scope of professional services available in various speech and language programs for the child in his immediate community and assist the family in locating such agencies and personnel as might best serve their needs.

9. Setting up a series of prerequisites which must be met before various programs for speech or language training should be undertaken.

RESEARCH NEEDS

It is difficult to place a priority on those procedures and services which ought to be provided in the future for deaf-blind children with respect to their communication problems. This difficulty revolves around more than one observation. In the first place there are a limited number of deaf-blind children in any geographic area within the United States. For this reason, certain problems exist in initiating both diagnostic and continuing education facilities for such children. Secondly, this wide geographic distribution creates some difficulties in accumulating large enough research populations upon which to base new diagnostic and evaluative procedures.

Other than the geographic distribution of the population one must recognize the fact that there is a wide variety of disabilities and competencies shown by the children labeled as deaf-blind. This wide disparity within the population makes it extremely difficult to choose which portion of the population will receive special attention through diagnosis, through the establishment of treatment programs, and through the development of experimental programs. The population is multiply handicapped as well as deaf-blind.

A third problem in the establishment of future needs revolves around what is best demonstrated in the attached bibliography concerning those writings which have been completed on the communication problems of the deaf-blind. This bibliography is remarkably lacking in a demonstration of long-time, close scrutiny studies of the communication skills of the deaf-blind. In other words, those planning for the future in research or testing or treatment in this area are working from a base of information primarily derived from populations other than, although perhaps similar to, the deaf-blind.

However, without priorities and without concern over the possibility of accumulating a population for experimentation and clinical service, there are some problems which stand out as needing particular attention.

First, because of the markedly low level of performance and competency demonstrated by this group of children, it is clear that information must be accumulated which will allow us to establish a protocol for the educational process with such children. We must begin to understand which skills a child can be taught earliest and which skills must be taught later on a base of certain prerequisite learning.

Secondly, it seems important within the very near future to begin a series of follow-up studies to determine what happens to children with varying degrees of sensory loss in two modalities as well as a variety of concomitant disabilities over a period of years in various placement settings. Obviously, there is a certain superficiality in a detailed diagnosis which makes recommendations without a long-term understanding of whether or not these recommendations can be followed up and are being followed up and are being successful in their outcome. The question is, "How many deaf-blind children learn to communicate, to what degree, and at what price?"

Thirdly, within the experimental clinical situation or within the earliest stages of formal education for the deaf-blind child there must be an attempt to study the methods for obtaining interaction with hitherto uncommunicative children. The implication of this statement is not that the speech pathologist or the teacher of the deaf-blind child should look for the first means for developing speech or language, but that these people should be seeking to determine the first means to establish interpersonal contact. It would appear that this initial relationship is crucial to the building of a communication competency within the area of speech and language.

A fourth problem, which is perhaps too far outside the communication area to be discussed here, nevertheless seems crucial here as well as probably in many other areas of educational planning for deaf-blind children. This problem is the need for early parent contact at the first suspicion of multiple disability in the child. Over the years the effectiveness of early parent contact in such problems as cleft palate, mental retardation and cerebral palsy, have demonstrated their great value. There does not seem to be, at this time, an early enough action program for counseling, information sharing, and clinic-parent interaction during the first family crisis which centers around the identification of the deaf-blind child. It is quite possible that the problems which are apparently the result of this early parent contact are closely related to the same problems mentioned earlier, namely, the problem of establishing contact with the child.

A fifth concern is perhaps more experimental in a theoretical sense than directly clinically applicable. The work currently being conducted with these severely handicapped children has some implications which are not supported in science. There are assumptions made throughout our testing that since the child is deaf and blind that he has other intact sensory avenues such as olfaction, taste, temperature sensitivity, motion awareness, and proprioceptive-kinesthetic skills. At present our means of assessing the extent to which the child is sensitive in these channels and our means of utilizing them for the establishment of interpersonal contact and the development of a sense of well-being in the child are probably not being utilized because of a lack of knowledge about them.

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CASEWORK EVALUATION

Vernon Wolston

INTRODUCTION

For some time the application of casework methods to the evaluation of handicapped children has been of concern to me. It has long been known that the interrelationships in a family are crucial to the stability, capability, and emotional health of the individual members.

It is strongly felt that any disequilibrium in family relationships may produce difficulties for any or all members, and the hope and aim of a casework evaluation and family interactional study is to make possible the identification of such family disequilibrium and to appropriately communicate it to the responsible family members together with recommendations for medians or modalities which may be utilized for the resolution of the problem. This would include the entire range of services from psychiatric clinics or hospital care through family agencies and other community social agencies designed to aid families in coping with the problems of family interaction and to provide emotional support for developing ego capability to its maximum. The entire program for dealing with the many facets of the rehabilitation of the physically and emotionally handicapped are certainly to be included here.

Whenever the question of evaluation is raised, uncertainty and anxiety are produced for not only the individuals involved directly but also in those peripherally related as well. One need only begin to think of his own experiences in various test situations to recognize that evaluation in its simplest form comes down to testing the capacity of the individual to function in one way or another and to determine the degree and capacity of other resources that can be brought to bear to aid in this function. Thus evaluation includes a concept of test or determination of capacity. While evaluation for a multiply handicapped child himself may not represent clearly a test situation, it does represent this to his parents, relatives, and those who are concerned with him at the time he appears for examination. For the child himself, he is confronted with new and different persons and in many cases these persons can only be sensed imperfectly through their presence or in their degree of interaction.

It is understandable, therefore, that patients and relatives, particularly parents, come to any evaluation setting but in particular the one for evaluation of handicapped children at Syracuse University with a sense of hope, expectation, and yet with anxiety and in some cases a sense of dread.

The social work and behavioral science literature as well as that from medicine, pediatrics, and psychoanalysis are much concerned with the relationships between people and the effect of the presence or absence of significant adult figures in the lives of children and variations in their development.

The study of neurological and sensory disorders in the State of New York for the New York State Health Department showed inadequacies in service, communication, and evaluation programs for blind children studied in three major communities. As a member of the research team on this project, my interest in examining what might be done to look further at more comprehensive and total evaluation methods was stimulated. Opportunities for discussion of this matter with Mr. Edward Donlon, also a participant, resulted in the inclusion of a casework evaluation method in the total evaluation program of the multiply handicapped children at the Center for the Development of Blind Children at Syracuse University. This addition of a casework and family interaction evaluation was begun on a small scale in the latter part of 1963.

METHODOLOGY

The methodology of the casework evaluation and family interaction evaluation is primarily on the basis of an interviewing technique. Each of the parents who accompany their child to the Center as part of the evaluation, is interviewed separately and usually together thereafter. This is most often the mother and the father of the child, although occasionally for various reasons, one or the other, and sometimes both of these natural parents are no longer in the picture and the child is cared for by an aunt, uncle, foster parent or adoptive parent. In any event, these persons in direct relationship to the child are interviewed for purposes of establishing the interactional picture and for information about the significant relationships with the child.

An effort is made to look at each parent in his relationship to each other family member or household member and also to the group as a whole. The reasoning relevant to this is to be able to make predictions concerning family behaviors and to provide a way of anticipating reactions to stress situations which may be ahead for the family.

In addition, frequently the Department of Social Services, social worker or representative of one of the other community agencies concerned with the development of the child, accompany the family to the Center at the time of the evaluation. It is particularly useful to have some contact with this person also at the time of the evaluation as he well may be the major instrument in implementing recommendations which will come as a result of the evaluation at the Center.

In practice, the evaluation program has considered as primary the interactional patterns between the multiply handicapped child and his mother. In most all cases, mother or mother-substitute has the major role to play in the child's care and development. This necessitates a vast amount of time, energy, emotional response, and a never-ceasing pressure on the mother for the development of additional skills to meet continually increasing demands for greater capability. For this reason, the initial contact and discussion has been centered around the interview with the mother. From the outset the mother is encouraged to discuss her feelings concerning the evaluation, the trip to the Center, her attitude toward coming, what she hopes to gain from the evaluation, and ultimately coming into a more direct discussion of her relationship with the handicapped child. Efforts are made to examine with her the impact of the discovery of the handicap, when it occurred, and how it was received by the family, especially by herself. Discussion of pregnancy, period of gestation, illnesses during the entire period, delivery, the impact of the handicap on the mother, and her method of handling it are rigorously pursued in an effort to understand her as a person and to evaluate and determine her characteristic way of handling stress situations and external pressures.

Next, the mother's background is examined from the view of the family orientation, the family in which she grew up as a child. Parental attitudes and their effect on the development of her personality are scrutinized. The number and sex of siblings of the mother and the attitudes, personalities, marriage and birth history of children of these siblings is also considered in the light of understanding the mother and any possible heredity factors to be further examined.

Next, an overview of evaluation is elicited and an inquiry is made as to the principal goal of the mother in bringing the child to the Center for the evaluation. It is desirable to determine not just the superficial attitudes about coming to the Center, but rather the kind of motivation and goal which the mother has for the child. How does she view the future potential capability of the child for educational training involvement.

Articles like Korner's emphasize the importance of carefully examining the relationships in family interaction and trying to understand the degree to which the relationship is influenced, not only for the child but for the mother as well. The degree of this influence on the mother is felt by all the family members in turn.

> "In the last 20 years, an increasing number of investigations have demonstrated the crucial importance of adequate mothering for early child development and sound ego growth. Maternal deprivations studies, scrutiny of the early ego development of institutionalized children, and accumulative

> evidence from clinical case histories all point to the inescapable relationship between inadequate or insufficient maternal care and a variety of ego defects in the child.
>
> In more recent years numerous investigations have addressed themselves to the opposite side of this question: To what extent do characteristics in the child himself influence parent-child interaction? This search for factors in the child that may jeopardize a mother's capacity to relate to him was largely stimulated by work with childhood psychosis and infantile autism. From this concern with the extreme deviations has sprung an interest in the individual differences among normal children. Research findings clearly demonstrate that individual differences in disposition and temperament do exist among newborn babies but there is a lack in incorporating this fact in child rearing practices and in considering these basic differences in diagnostic and therapeutic formulations it is always experience that is held accountable for any deviation.
>
> Often when parent-child interaction is discussed, reference is really being made to what the mother does with or to a child. Unwillingly the interaction is seen as a one-way street rather than a true reciprocal exchange. Individual differences among children are rarely accorded sufficient importance in explaining variations in the development and the differences in ease of mastering various developmental tasks. It is always the mother's handling her personality and her difficulties that are considered at the root of the child's problem. While the mental health professions, in their recognition of the tremendous importance of adequate mothering have done a great deal to promote enlightened child care practices they have also helped create a generation of guilt-ridden parents. In some quarters, to understand any difficulty in any phase of a child's development, the dictum is "cherchez la mere." In the process, the child, a separate organism with his own propensities and vulnerabilities--is overlooked."1

If we see these feelings develop with so-called "normal children," the problems in relationship with a multiply handicapped child are certainly heightened to an exponential degree.

If the father of the handicapped child is available at the time of the evaluation, an interview is also conducted with him going over much of the same ground as that in the interview with the mother. Each of these parents is asked to discuss in his own way the impact on the opposite parent at the time of the discovery of the handicap together with an expression of the impact on himself. A consideration with the father is also carried out in regard to financial resources, living arrangements, and matters pertaining to his relationship directly with the child. The amount of time he is able to spend directly in contact either in a play relationship or in some aspect of instruction or direction is solicited. Most often the picture seems to be one of play with the father and whatever teaching and training is carried out with the child is usually conducted predominantly by the mother.

The parent interviews are conducted separately for the most part, though on some occasions a third interview is possible and is held with both parents present. This is particularly desirable if interactional patterns between the parents are in need of observation. In the parent interviews discussion of the child and relationship to whatever siblings are also in the family, and the handicapped child are explored in detail. In addition to this exploration and examination of behavioral relationship between the siblings, parent attitudes concerning these relationships and behavior differences are pursued.

Perhaps one of the most important aspects of the interactional evaluation is that of the relationship between the parents and the marriage together with the impact upon the couple with the birth of their handicapped child. Examination is carried out regarding the emotional responses to the knowledge that the child was handicapped. The effect on each marital partner and changes in the marriages as a result of the birth of this child. A total marriage history is obtained in as complete detail as possible in the time available and an assessment of individual personality characteristics of the partners is made.

IMPACT OF THE BIRTH OF THE HANDICAPPED CHILD

In most situations the anticipation of the birth of a child is a joyous and happy experience. The family is pulled closer together in general with a desire and curiosity about the new child to be born, and the entire period is one of eager anticipation and culminated in the birth experience and the unparalleled feeling of having produced a new life. This entire operation, however, can be dreadfully and horribly distorted with the birth of a handicapped child. The question of blame, guilt, responsibility, and emotionalism ranging all the way from rage to despair are frequently experienced by one or both parents. These are more initial reactions which are later to be followed by ones which are perhaps more concretely related to reality and which require some direct decision-making on the part of the family. In all cases, the family must make a readjustment to a whole variety of things. The stress situation experienced by the mother and father produces in each the reaction characteristic of their individual personality when encountering external pressures, frustration and anxiety. The parent in effect becomes a different person in part than before the traumatic event occurred. Therefore, relationships and interactions require a re-evaluation and a realignment of feelings is necessary. To be sure there are individuals who rather stoically and outwardly manifest little or no emotional response, but are often later to be found at a deeper level to be experiencing tremendous upheavals. I am confident that the experience of the birth of a handicapped child can never be taken lightly or quite as philosophically as some of us would like to imagine or as some parents would like to have us believe.

At some level the impact and sense of tragedy exists. This is not to say that we do not see as a result of this impact a tremendous resurgence of effort on the part of the parent. Realignment and emotional strength erupt as if to make up for that which is deficient or absent in the child.

Some mothers are seen to be so tremendously involved that their never-tiring efforts seem endless in this pursuit of resources, special programs and in some cases futile pursuit of someone to give a different and more reassuring outlook. Tremendous sums of money are expended in some cases needlessly for such answers which is of course most unfortunate for the family as later these funds might well be more effectively channeled toward rehabilitation services or training programs.

Family readjustments, therefore, are necessary between siblings who have now a new and different situation with which to respond to in the family. A difference in the parental attitudes, both toward each other and toward them. Attention may not be so prevalent to older siblings because of the pressure required for care and emotional concern about the new handicapped child.

In addition to this sort of family readjustment impact, there are social effects as well. The family is faced with questions concerning the discussion of this problem with neighbors, friends, and other relatives. If a sense of guilt or shame is associated with the handicap, parents and indeed siblings may have a sense of shame and be affected in social relationships to the extent that this emotion is experienced. School grades of siblings may drop, work efficiency of husband may diminish and all may experience a sense of social isolation because of the feelings of themselves as different.

> "The child who suffers from an illness. . . which leaves him with a permanent defect is faced with the problem of reality in his adjustment. From that time on he is no longer like other children. He cannot do the things they do and, therefore, is really inferior to them. He is forced to compensate for this inferiority by developing

> other modes of obtaining success in life. Sometimes these compensations are socially acceptable as when the child compensates for extremely defective vision by developing an acute sense of hearing. Sometimes they are not so desirable as when a child compensates for a weak leg by making himself the leader of a delinquent gang or by giving up all physical and social activities, spending all his time reading and studying."[2]

It is therefore the concern of parents and all who are involved in any aspect of counseling or evaluation to be particularly aware of special compensatory behaviors on the part of the child or the parents which are deviant or are in any way pathological. It is these kinds of concern which has lead to the utilization of casework evaluative techniques in the assessment of family interactional patterns. In the evaluation program of the multiply handicapped child at Syracuse University, it is strongly felt that these evaluative programs of family interactions provide a different dimension of evaluation and a further aspect of the needs of the multiply handicapped child.

Schild has described specialized clinics and social agencies dealing with the complex task of helping family and child live together more comfortably in the home where this is possible and institutionalization is not required.[3] Although Schild is referring primarily to problems of retardation, many of the same attitudes are being dealt with by parents of the multiply handicapped child. She also emphasizes the importance of ambivalence in the parent and how this can be used to help the total family relationship.

> "Enormous ambivalence of feeling is evoked in a parent when he learns that his child is retarded. Feelings of rejection, dejection and disappointment collide with anxious hopefulness, doubt, anger and self-pity. Strong emotions of guilt mix with protective parental reactions; resentment, confusion and insecurity become pervasive. It is this ambivalence that characterizes initial work with families of retarded children. These conflicting emotions are never completely resolved, as the long-term aspect of the problem and the repeated crises that stem directly from the fact that the child's handicap stir up the ambivalence from time to time. To help the parent, it is necessary to ferret out the positive aspects of the ambivalence and help him to build on these so as to find some answers to the problem immediately at hand. Thus, ambivalence is dealt with in relation to the immediate crisis situation on a reality basis and by focusing on the areas that are conducive to meeting the needs of the family."[4]

It is because of this sort of awareness of parent feelings regarding handicap and its relationship to all family interactions that the emphasis is placed on bringing to light some of this ambivalence described by Schild. All too often these feelings continue to remain unexpressed and to some degree only unclearly known even by the individual parent himself. The casework evaluation of the family interaction can provide the median for clarifying with parents their attitudes about their child and may enable them to move forward in a more realistic fashion towards achievable goals.

A multiply handicapped child frequently suffers from defects above which he can never completely rise and which leave him with a permanent incapacity in terms of his social and environmental functioning. He and his parents, as they observe his relationship with other children, become increasingly aware of what amounts to real limitations regarding what he can be expected to accomplish.

> "A factor accounting for sustained ambivalence toward a retarded child is that the parents are deprived of the opportunity to project any blame for the problem onto the child himself. It is too difficult in any rational way to blame the child for his own defect. This differs from situations to which social pathology exists and becomes reflected in a disturbed parent-child relationship. (For example, in emotional disturbance and delinquency, the parent realistically is able to hold the child partially responsible for a share of the problem.) This serves to alleviate some parental guilt and lowers resistance to accepting help. In the area of mental retardation, the self-accusatory parent who feels that he is alone in some way accountable for his child's limitations, is very well known. It is an accepted fact that part of the resistance of the person seeking help stems from his feeling of responsibility for the problem. When guilt is intensified the resistance to help will be proportionally increased. Because of this, those endeavoring to help parents of retarded children must be aware that heightened resistance is usually due to the inwardly projected guilt of the parent. In counseling, this guilt needs to be alleviated and an empathetic understanding of the problem area imparted to lower the parent's resistance, freeing him to benefit from the offered help. Most parents hope to hear an authoritative and sympathetic endorsement of themselves for their human parental competence, and their right to blame themselves for what has happened."[5]

The physical attention required by the handicapped child may indeed be considerably more than that of a so-called normal infant and this confining attention may not be so easily handled. Baby-sitters and even relatives may be difficult to obtain because of the greater care which this child requires. Questions may also be raised in the minds of the parents concerning the treatment that the child may receive when left in the care of anyone who is only superficially involved. These may be the only persons available but they tend to be regarded as lacking somehow the involvement which the child needs.

Father Carroll in his concern of blindness observes that:

> ". . . public generally unconsciously fears and rejects blindness by pitying and rejecting the blinded person, so too his family. And a sighted person generally unconsciously feels ashamed of these reactions and so tries to conceal them from themselves, so, to a far greater degree to the members of a blinded person's family, often setting up many and very disturbing tensions."[6]

Also parents frequently feel that they cannot continue the same sort of social life which was possible previously. It is not unusual to find a diminution and even a decrease to zero in the amount of time spent by the couple away from their children and with friends.

Church activities may or may not be something of value for the couple but for those who have a religious faith, the impact of the birth of the handicapped child often seems to have special meaning. These meanings vary from punishment for a wrongdoing or a supposed wrongdoing which may or may not have been factual all the way to the sense of responsibility and a feeling of being especially selected to meet the needs of this child. It is clear that some families use their religious faith as a strength supplier in handling the impact for them of this upsetting event. This frequently is a useful means for the family and is a sustainer for them in terms of the maintenance of the ability to function adequately. However, there seem to be other factors which also enter into the psychological functioning of the individual. So, as a third impact one must examine the psychological aspect. In addition to what I have just described as a continuing ability to function behaviorally there frequently is an unexpressed but readily apparent depressive response to the impact of the birth of the handicapped child. The overall sense of well-being, competence, aggressive direct seeking of additional services and undaunted courage is very often a thin veneer which serves to protect against the expression of grief, despair and other depressing thoughts existing within the individual. These thoughts at various times move into the conscious awareness of the patient particularly the mother who in turn is affected in her social relationships, family relationships and sense of personal adequacy.

> "One way of ameliorating the guilt of parents is to counsel them together in joint interviews. This helps to focus on the mutuality of feelings and responsibilities

> shared by each parent and aids to shift away from individual parents the assumption of self-blame for the problem. The joint interview technique often may help to restore marital balance around the mutual concern for the child so that the parents are better able to mobilize their strengths to handle crisis situations."[7]

These parents are called upon to face a situation with all of its realistic impacts which may have never been considered before by them except in a very general sense of inadequacy at the prospect of having the responsibility of a newborn infant.

> "The birth of a congenitally defective infant transforms a joyously awaited experience into one of catastrophe and profound psychological threat. The apprehension of failure that is a normal part of the psychic anticipation of parenthood turns into reality--and the family finds itself in a crisis."[8]

Greta Bibring considers the entire period of gestation as one of strained enhanced narcissism for the mother. Significant endocrine and general somatic, as well as psychological, changes occur. The pressures continue after delivery and disappear gradually in reciprocity with the child's development. Thus, the natural course of discharge of tension, as the mother responds to her normal child and achieves the emotional satisfaction of experiencing expected maturational milestones with him is denied the parent of a child with a severe birth defect. The heightened emotionality of the father--as a result of his own anxiety and in response to his wife's needs--is also denied its normal release.[9]

> "Parents search within themselves for non-existent answers to 'Why has this happened to me?' 'How did it happen?' 'What have I done?' Previously worked out feelings of self-doubt and inadequacy may be reactivated as they view the damaged child as an extension of themselves. It is as though their flawed self image had taken form and shape and can no longer be concealed. Marital disruption can occur if the child is seen as a symbol of underlying failure in the marriage. Conscious or unconscious death wishes toward the child intensify the anxiety.
>
> This is not to imply that there must be inevitably a pathological reaction; sorrow and a sense of crisis are a natural response to a tragic experience. During such periods, however, the balance of personality integration usually goes through a phase of disorganization. In helping families in this point of turmoil, a social worker faces both an especially difficult challenge and a unique opportunity."[10]

It is an important aspect of family interaction evaluation to determine the degree of effect which the birth of the handicapped child has produced and how this can best be dealt with for the whole family.

The foregoing paragraphs have discussed the impact of the birth of the handicapped child in three phases. First in terms of family readjustment, secondly in terms of social interactions outside the family, and thirdly, in regard to individual emotional response. This and the discussion of methodology and interviewing with the parents, one emerges with fairly clear impressions of family interactional patterns, characteristic ways of handling stress and ways of dealing with angriness and frustration together with their effects on communication and interactional patterns in the home. It is in these areas that the major contribution of the case work and family interactional evaluation study is to be found.

It seems clear from the preceding discussion that depending upon the cooperation and active participation of the parents in giving information about themselves and their family relationships that a great deal may be gleaned concerning the family reaction patterns, characteristic ways in which the members deal with their stress situations. Considerable is also known at the conclusion of these discussions concerning the basic personality configuration of the various members of the family. Special traits, special considerations in their relationship of one to another, as well as the degree of emotional maturity of each as they interact together. The degree of dependence on each other and the capability for independent striving is of critical importance because of its relationship to the family ability to move forward with realistic planning concerning later developments with the handicapped family member. The opportunity presented in these interviews for assessment and discussion with the parents affords the interviewer an opportunity for communication with one spouse concerning the needs of the other, both in relation to factors about the child and perhaps even more importantly concerning the needs of one parent for the other. It is not infrequent to see deterioration in the marriage in the sense that there is a fear of conception of additional children due to the possibility of further congenital problems and further handicapped children being born. This results in a pulling away from the spouse emotionally and confecting the child as the major involvement to the determent of other family relationships including both spouse and children.

The opportunity to discuss plans with representatives of local social agencies serving the family very often will provide the opportunity for the interpretation of the family relationship needs and recommendations concerning further help of a professional nature for the family with someone who can support and encourage the family to move in the direction of such help.

The birth of the handicapped child does not necessarily have to be a detrimental thing to the family relationships. If attitudes and feelings concerning this child, many of which have been described in the foregoing statements, are worked through and placed in proper perspective. There may also be underlying psychological problems preexisting the birth of the child which are only precipitated into major problems by this event. Where these exist the referral for a psychiatric clinic appointment for further evaluation and treatment are strongly indicated.

The community social agencies may also be of a major service in relation to help for improved interactional patterns of a family. Financial stress on planning for special needs may often be aided, supported or augmented by departments of social service, public assistance in the area of child welfare or bureaus for handicapped children. In this connection also various rehabilitation programs may be called into play for the special needs of the child. Very often these are either unexplored or unknown and when located their utilization by the family can often be of considerable help.

One of the major concerns which parents have in presenting children for evaluation at the Center concerns education, training and trainability of the child to as high degree of independent functioning as is possible. This seems to be a predominant comment of parents coming to the Center. In some cases, a school program may mean physical separation from the child because of training school placement or indeed some cases it may be recommended that the child be institutionalized which requires therefore an even more permanent separation from the family. This sort of decision is extremely difficult and for some families is next to impossible without professional guidance and help. The special contribution of the case work evaluation endeavors to examine the family's capability and strength in looking at, deciding and handling such a decision if this is at all imminent. It is also possible to have a prediction concerning the anticipated response of one or more family members to such developments. Hopefully this provides opportunities to develop a means for working through to a decision and carrying on following it through the utilization of community resources. The interpretative comments, recommendations and explanations concerning family relationships, patterns of functionings, reactions to stress and other findings of the casework evaluation are aimed at a more global assessment and ways to therapeutically assist and aid in the development of improved family relationships with the view that these provide for human growth, satisfaction in living and a general atmosphere which all children need to grow mature and develop into stable adults. If this environment is important physically and emotionally for all children, it is indeed that much more significant to the child deprived by multiple handicaps and it is therefore imperative that all efforts be directed to improve family relationships in these most needful situations.

It seems appropriate at this point after taking a long look at the evaluation program as it has developed, to give some consideration to what may conceivably be developed in the future in the evaluation program. In any program there are strong points and weak points and through a process of stabilizing strong points and eliminating the weak ones a more effective evaluation may be obtained. It is of this view that the following considerations are entertained:

One problem which has emerged in relation to classifying families and problems of multiply handicapped children stems from the fact that at the present time data as obtained is generally rather unique and individual for that particular family situation which means that it does not lend itself to cross comparisons with other families without some considerable effort and individual study of each case situation. Although this does not interfere with individual evaluation potential for the child and his parents it does make it more difficult in organizing and sorting material for research purposes. Future developments should therefore lead to an organizational format and standardized form for history and relationship material to be recorded thus allowing for a more rapid comparison between cases. This would in no way interfere with the quantity and quality of material obtained but rather it would apply a way in which this material is organized for special purposes. This is a possible outgrowth of a later project.

A second and very important aspect of the evaluation program relates to the ability to study the contents, affect and response of the family members and their interrelationships. At this time, the outcome of this important aspect of total evaluation is dependent upon the skill, capability and immediate recall of the professional doing the interviewing. Only in the more recent evaluation was the use of a tape recorder for the purposes of providing review of content and affective expression brought into use. The use of such recording devices is of considerable benefit since it allows the interviewer to hear the interview repeatedly and to utilize this in reaffirming and confirming with others what were initial impressions. It seems likely that the benefits derived by the utilization of tape recorders is only the beginning in the use of mechanical devices in this important work. With this in mind it would seem most desirable to eventually look to the use of video tape equipment for recording of the interviews and thereby accomplishing not only recording of the verbal reproduction but also the communication patterns occurring through non-verbal behavior or non-verbal communication but are clear through facial expressions and body motions. Some thoughts have been given to the possible use of such equipment as aids to the kind of evaluation we are currently conducting.

There is another important adjunctive value to the use of such materials: this is the realm of teaching. Already we have utilized monitored interviews with students participating as listeners but the use of video tape would provide a much better opportunity for their observation. In addition, the ability to stop in the middle of material to discuss with the student the importance and direction of the interview and the evaluative process is obvious.

An additional recommendation for improvement of the program relates to the importance of discussion with community people of the area where the patient lives in order to here often have the kind of follow-up on the patient which has been previously discussed. It is also extremely important for these community people to have the opportunity to see the evaluation in progress and to receive recommendations from the Center personnel involved so that they too can feel a part of both the total evaluation and in the following up on recommendations from the Center for the family. Very often family members need this kind of supportive relationship in order to carry out the recommendations of a comprehensive evaluation. If the local community worker has been at the Center and participated in the evaluation he and the family all know the recommendations and there is greater chance that the recommendations will be carried out.

In most cases a definite plan is derived from the evaluation. So often families travel from "pillar to post" and are told many different things concerning their child without these being coordinated or unified in a program related to future planning. This situation if not well understood by the family can lead to a rather chaotic and unhappy situation at home. With a unified plan for next steps coupled with emotional support from community agency representatives who also know the recommendations there is much less chance for misunderstandings to develop and the greatest opportunity is afforded to the child.

It is for these reasons that I feel strongly that this kind of evaluation program should not only be continued but should be expanded in order to meet the needs of the very many multiply handicapped children who are not able to make use of this program for one reason or another.

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PEDIATRIC EXAMINATION

Miriam Swift, M.D.

The pediatrician's role in the team approach to the study and evaluation of the multi-handicapped child is twofold.

His primary purpose and duty is to take a complete history and perform a physical examination. This obviously is necessary to scientifically categorize under diagnostic techniques the congenital or acquired physical aberrations the patient may have so that the other members of the team may correlate the relationship of these findings to the patient's behavior and ability to function. Through a complete history and physical examination the pediatrician can summarize the onset and/or age of recognition of medical problems and behavioral symptoms, the procedures which have been instituted in any correctional attempt and fully screen out any presumptive or heretofore unrecognized diagnostic problem.

The second contribution the pediatrician may make as a member of the evaluation team is the establishment of rapport with the parents. In taking the history, the pediatrician listens to the long and frustrating experiences that the parents usually have to tell. The parents go through an outpouring of their feelings and experiences in an unguarded manner that does not occur in their relationship to any other member of the team. With the other members they become very guarded and defensive in their approach to the testing situations concerning their child.

Because of the nature of the pediatrician's role, we have come to believe that it is important for the pediatrician to be the first to contact the patient. From the medical point of view, this gives time to arrange for any specialty consultations which may be desirable. The most frequent consultations requested are complete cardiac, endocrinological, and otolaryngological examinations. Complete ophthalmological studies are routine.

On arrival at a strange destination with a group of unfamiliar, formidable, "experts," the parents can more easily relate to the pediatrician--a familiar figure to most. Thus, the parents can ease into the evaluation situation by first telling their story in detail. Also, the pediatrician, alert to any manifest attitudes or personality traits of the parents, may pass these on to the other members of the team so that they may be prepared to meet these to the best advantage of the patient in the succeeding testing areas.

We use a six page mimeographed form for the pediatric history and physical which was worked out primarily by Dr. Evelyn Eddy.* The form leaves appropriate spaces under the various headings for making notes while getting the history or having the physical exam. An hour and a half is the usual time scheduled for the history and physical examination of a patient.

The historical approach to a history, the "Chief complaint and present illness," we usually combine into an opening question to the parents of "What do you think is (the patient's name) biggest problem?" This will either be answered singularly and then lead on into many problems or may be answered in a pluralistic manner. This question immediately throws the ball to the parents and launches them on a good introductory statement that leads naturally to the summarization of the medical picture and, often, the educational and social as well.

We then go back to the prenatal history. We discuss it in great detail, asking such questions as a summarization of general health, the gestation period, any complications such as bleeding, infections, sibling infections, toxemia, vomiting, and anemia, when they first had medical attention, type, and where and any medications given. Under labor we go into the duration, anesthesia, drugs given, and complications either during or immediately after. This is usually a convenient time to find out about other pregnancies, miscarriages, or still births. Following this, we usually come back to the patient for the birth history asking such questions as birth weight, cry, resuscitation, use of oxygen, activity, congenital anomalies, neonatal conditions such as anemia, respiratory problems, vomiting, rash, or convulsions.

Under feeding we ask concerning breast feeding, weaned, why, early formula, what time solids, what techniques, supplemental vitamins. We inquire into the present diet, appetite, feeding methods, any problems such as vomiting or constipation, use of tonics or cathartics, and weight gain at six months, one year, and present weight.

The development history is difficult to get and is often not reliable. This is frustrating because it can have significance if accurate. For developmental history we try to find out at what ages certain physical growth and the related functional behavior took place, namely, head control, eye control, vision, communication, recognition, hearing, roll over, sit, crawl, stand, walk, talk, sentences, dentition, bowel and bladder control, and self fed.

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*Associate Professor, Pediatric Department, College of Medicine, State of New York, Syracuse, New York.

The family history consists of mother's and father's name; address; age; occupation; education; general health of parents and grandparents, maternal and paternal; familial disease, such as heart disease, kidney disease, diabetes, cancer, neurologic disease, allergies, blood diseases, or mental illness. Also of interest are any congenital defects among the offspring of brothers or sisters of the parents. Under a general heading of habits ask questions concerning outdoor play, sleep, thumb sucking, temper tantrums. Under motor in this area is wetting and soiling, head rolling, head banging, rhythmic movements or masturbation. The patient's posturing is important and the ability to use objects.

In an effort to determine the parents' attitudes toward the handicapped child and, also, the feeling of the siblings for one another, there are several leading questions which we ask of the parent: "How do you feel about discipline in general?," "How do you feel about discipline in relationship to this particular child?," "Do you feel this child needs different treatment from your others? How?," "What are your expectations for this child?," "What are your expectations for your other children?," "How do your children get along together?," "Is there any resentment or hostility on the part of the other children toward this child or vice versa?" Many times, one of these questions will lead to a lengthy, descriptive discussion which can be very enlightening.

Early in the history taking procedure, because of concern over major problems, the parents are likely not to include the day to day or ordinary illnesses the child has incurred. At this point we pick up such details as febrile conditions of unknown origin, measles, German measles, chicken pox, whooping cough, mumps, frequent U.R.I., tonsillitis, otitis media, pneumonia, encephomeningitis, convulsions, anemia, tonsillectomies and injuries.

An oversight frequently found is lack of routine medical care. This is explainable because the parents and child so often are caught up in movement from one specialist to another that there just has not been time for such mundane things as immunizations. It is important that these children have the same routine medical care that one expects for any child. This includes dental care. To tie up loose ends and to pick up any oversight in the history taking, we finish by running through a system review such as skin and mucous membranes, cardio-respiratory, gastrointestinal, genito-urinary, CNS and the skeletal system.

A physical examination of one of these children requires a great deal of patience and agility. After the length of time spent taking the history, the child has become acquainted with the room and with the examiner, especially if the examiner makes occasional contact with the patient. However, the examiner must proceed slowly to gain the confidence of the child and whenever possible explain to the child what he will be doing. Sometimes communication can best be accomplished through the parent.

It is best to proceed in the usual manner that one examines an infant, regardless of the age. Often one does not go too far before the patient becomes extremely agitated. Therefore, examination of the chest should be done first to insure maximum quiet and cooperation in listening to the heart and lungs. This is an extremely important area because of the frequency of a congenital cardiac situation in the multiply handicapped child.

Attention to the general appearance of the child is most important. Often several members of the team will get the same impression just from the odd faces, shape of the head, body stance and contours, even before the history is taken or even when the history does not reveal anything conclusive. A good example of this is the Rubella syndrome. There is often a characteristic appearance of a Rubella child which one becomes very familiar with after seeing several of these children. The microphthalmia and microcephaly contribute primarily to this "look." Often with examination this can be further substantiated by the maldevelopment of the heart and brain and the presence of congenital deafness. A genetic problem which is recognizable by the appearance of the child is chromosome mosaicism. The child is often way under the height and weight percentile for the age, there may be prominent epicanthal folds, the ears are set low, the neck may be webbed, the nipples appear to be widely spaced, there may be shortening of the forearm, and a deformity of the fingers. There is often a soft systolic murmur.

For any cardiac condition that seems to be more than an innocent murmur, we refer the child to the Pediatric Cardiac Department of the Upstate Medical Center where examination, CBC, X-ray, fluoroscopy, and electrocardiograms are done. After the study is completed, the cardiologist spends time with the parents and the caseworker explaining just what the condition is, what the prognosis is and what, if any, treatment is necessary. It is often possible to refer the case to a pediatric cardiologist in the area from which the patient comes, to follow the case or implement any treatment necessary. This is a most reassuring experience for the parents for often there is great uncertainty in their minds as to the seriousness of the heart condition which has usually been pointed out to them but most inadequately explained.

If there is any question of chromosomal aberration, the child is referred to the Pediatric Endocrinological Department of the Upstate Medical Center where buccal smears are done. Difficulty as to determination as either positive or negative leads to chromosomal analysis; X-ray, urnic studies, and blood work are also done as indicated.

After several years of experimentation, it was decided that an otolaryngologist was not necessary as a permanent member of the team. However, one is readily available if needed. Probably the most frequent demands for the advice of the otolaryngologist are in cases of hearing loss where the possibility of a chronic sinus involvement or an allergic process may be dampening the conductive hearing. He is also consulted where there is a tonsil and adenoid problem or in case of any congenital abnormalities of the ear, nose, and throat. Very often the apparent deafness is not in the hearing apparatus of the individual but in the central nervous system. This evaluation or differentiation thus becomes the problem of the audiologist and the neurologist.

Because of the many neurological ramifications in these children we have found a permanent neurologist most helpful as a member of the team. His approach and techniques in examining these children are covered elsewhere in this book.

Any pediatrician studying such a child would naturally have his own method of organization and approach. I am also sure that over a period of years this approach will undergo many changes, as adaptation to this type of child is made. Therefore, I thought it might be helpful to include the form presently being used in our study, not necessarily as "the way" to do it but as "a way" which has undergone many changes over the past five to six years and at the present time seems satisfactory.

CENTER FOR THE DEVELOPMENT OF BLIND CHILDREN

Syracuse University

PEDIATRIC EXAMINATION

Name: MF Case No. Date:

Birthdate: Referred by:

Informants: Reliability:

Chief Complaints:

Prenatal

General Health

Gestation

Complications: Bleeding___: Infections___: Sibling Infections___:
Toxemia___: Vomiting___: Anemia___:

Labor

Duration:

Anesthesia:

Drugs:

Complications:

Other pregnancies, miscarriages or still births:

Birth

Weight: Cry: Resuscitation:

Oxygen: Activity Congenital Anomalie

Neonatal Condition: Anemia___: Respiratory___: Vomiting___:

Rash___: Convulsions___:

Later neonatal complications:

Feeding:

Breast Weaned: Why:

Formula (early) Other

Solids: Cereal Fruit Veg. Meat

Comment:

Vitamins: A-D C Present

Present Diet

Appetite

Feeding methods

Vomiting Constipation (cathartics)

Problems

Weight Gain: 6 mo. 1 yr. Present (Gain or Loss)

Comments:

Developmental:	Head Control	Eye Control	Vision
	Communication	Recognition	Hearing
	Roll over	Sit	Stand
	Walk	Talk	Sentences
	Dentition	Bowel	Bladder
	Fed Self	Body Control	

Father's Name:

Address:

Occupation:

Education:

Mother's Name:

Address:

Occupation:

Education:

Family Diseases:	Diabetes	Allergy
	Convulsions	Mental
	Neurologic	Blood

Others:

Habits: Outdoor Play Sleep

Thumbsucking Temper Tantrums

Motor: Wetting Soiling

Head Rolling Head Banging

Rhythmic Movements

Masturbation

Posturing

Use of Objects

Immunizations: DPT Vacc. Polio

Past Illnesses: (Date, Severity)

Febrile, U.O.

Measles

G. Measles

Ch. Pox

Wh. Cough

Mumps

Frequent U.R.I.

Operations

Tonsillitis

Otitia

Pneumonia

Enceph-Meningitis

Convulsions

Anemia

Tbc.

Injuries

Parents' Attitude:

Discipline

Expectations

Sibling Rivalry

Comments:

SYSTEM REVIEW: General Vigor Exercise Tolerance:

SKIN & M.M.: Rash Petechiae Nodules

Hemangiomata Other

CARDIO-RESP: Dyspnea Cough Murmurs

Cyanosis Squatting

GASTRO-INT.: Anorexia

Vomiting

Diarrhea

Abd. Pain

Other

GENITO-URINARY:

CNS: Headache Convulsions

Irritability

Nervousness

Motor Function

Strabismus

Vision Hearing

SKEL. SYSTEM: Bones

Joints

Muscles

Gait

%-ile

PHYSICAL EXAM: T. P. R. Wt. percentile Ht. %-ile

Boyd's Index
(where indicated)

Gen. Appearance:

Skin:

Head: Scalp AF Hair

Eyes: Globe Cornea Pupils EOM

Nystagmus Other (See Ophthal. Exam.)

Ears: Rt. Lt.

Nose:

Mouth & M.M. Tongue Teeth Adenoids
Pharynx: Tonsils

Pharynx Palate

Neck: Movement Thyroid

Lymph Nodes: Cervical Auxiliary Inguinal

Chest: Shape Ribs

Heart: Size

Murmur Rhythm Sounds

Lungs:

Abdomen: Tone Masses

Kidney Liver Spleen

Other

Genitalia: Hernia

Extremities: Muscle Tone Joints

Muscle Power:

Deformities:

Other: (See Neurologic)

AUDIOLOGICAL EVALUATION

E. H. Nober, Ph.D.

I. INTRODUCTION

A. Scope of the Problem. Congenital total blindness imposes a vast deprivation of sensory experience that reflects its consequences down to every molecular aspect of human development and maturation. It also imposes marked limitations, and like total blindness, has engulfing ramifications. In a general and diffuse way, the problems of deafness and blindness are parallel, but when the specifics are uncovered, marked differences evolve. For the education and habilitation of the blind, the cardinal salvation rests in the compensatory flexibility of the auditory mechanism. The deaf, on the other hand, rely primarily on vision to provide the sensory communication with the environment.

In a way, the foremost habilitative problem of the blind is "mobility." Unlike the deaf, the blind are able to develop adequate speech and language to communicate and interact on a verbal level. Assuming there are no concomitant complications, the blind develop relatively comprehensive language and the cognitive skills for good language. Some of the percepts of the blind are primitive as they result from a synthetic unification of experiences but they are made functional as photisms are developed through substitutive auditory experiences, i.e., "auditory synesthesia."

On the other hand, total deafness precludes the automatic development of language and the elaboration of concepts. To be sure, visual stimulation provides an effective source of communication, but like audition with the blind, the substitute has severe limitations and is noticeably inefficient when performing the functions of another modality. As a result, the deaf like the blind, manifest limited cognitive, linguistic, psychological, and social development and generally speaking are curtailed in achieving their full potential.

When there is a multiple handicap consisting of both blindness and deafness, the magnitude and complexity of the problems loom to dimensions. In this instance, the secondary compensatory mechanisms of each affliction has been eliminated and only the highly ineffective terciary sensory avenues such as the tactile, kinesthetic, and olfactory can serve as input channels. In this instance, the major objective of "mobility" cannot be resolved with auditory assistance nor can the major deprivation of language communication be relegated to vision.

In this manuscript, the focus will be directed to the various and sundry hearing impairments that can occur to the blind person, or to any person for that matter. There is no particular hearing impairment that is unique to blindness. Hearing loss is simply more devastating and debilitating to the blind who employ hearing for so many additional functions. Functionally, the blind person suffers markedly when he becomes deafened.

B. Levels of Hearing. Hearing can be described functionally on three levels, i.e., the (1) primitive, (2) warning, and (3) symbolic. Ramsdell (1947) depicted these three hypothetical constructs to explain the over-all functions of hearing and the effects of hearing loss.

1. primitive level of hearing. This connotes the constant and incessant bombardment of environmental sounds that hearing people receive and respond to on a subconscious level. Once the person becomes consciously aware of this incessant onslaught of auditory stimulation, it ceases to represent the primitive level. It contributes to the affective milieu that enables the hearing person to feel alive and an active part of the dynamic world around him. In the absence of this primitive level of perception the world feels dead. As a result, some people, who undergo a sudden loss of hearing, feel depressed and despondent. While it is true that the congenitally deaf probably do not suffer marked effects from an experiential void they always had, this aspect of the deprivation is still pertinent to adventitious deafness.

2. warning level of hearing. The loss to the warning or protective dimension of hearing is a deprivation that particularly affects the deaf-blind because vision and audition are the two major sensory protectors against impending dangers. No other receptive modalities can adequately substitute for this great loss. The loss of vision alone certainly renders the person vulnerable to a multitude of dangers but the deafness certainly confounds matters. First of all, vision is limited as a protective sense. For example, the protection is only limited to the visual range of the organism. It does not operate well in the dark, during sleep or even behind the individual. In this respect, hearing excels as it is a distance sense that functions incessantly, even during sleep. Indeed, it is common knowledge that a mother can condition herself to be awakened by her baby's feeble cry and yet sleep through intense noises such as thunder, etc.

Auditory protection, then, in contrast to visual protection, is effective on a subconscious level as well as on a conscious level. The blind quickly learn to exploit auditory protection to its maximum and as a result often allude to having more acute hearing sensitivity. This myth has been perpetrated for ages, but in fact, the blind as a collective group, have slightly less sensitive hearing than nonblind subjects. Blind people cannot relegate extraneous sounds to the "background" as readily as seeing people and consequently are more aware of all auditory stimuli. The figure-ground relation of the blind assumes different proportions than with the hearing.

Within the framework of protection is the problem of "mobility" with the blind where hearing provides signal detection. This phase of rehabilitation is typically depicted as the foremost problem associated with blindness. Lowenfeld (1948), Meyerson (1957), Rusalem (1962), and a host of others have stressed the importance of hearing in the role of acquiring mobility. Most of the studies dealing with audition and blindness deals with the relation between some parameter of hearing and how it relates to mobility.

3. symbolic level of hearing. The third level of hearing deals with the symbolic and aesthetic aspects of audition. Oral symbolism or speech is the foremost means of intimate human communication. While the blind naturally use their hearing mechanism as the encoding device, the deaf employ vision or speech reading* as the major substitute for aural communication. A skilled and proficient deaf speech reader can glean a great deal of information from the visual complex confronting him; in many instances of total deafness this is the only means for receiving and encoding the speech of others. Vision, of course, is mandatory for written or graphic communication, and in total deafness, is the major avenue for educational management.

The combined loss of vision and audition yields insurmountable barriers to normal speech and language acquisition as the primary and secondary mechanisms are destroyed. As a result, educational and rehabilitative management of the deaf-blind person looms to an enormous undertaking as the remaining senses are notoriously inefficient as compensatory receptors.

There is still another dimension to the third level of hearing--the aesthetic aspect. Here the affective inner joys that sounds such as music can generate. Environmental sounds such as the rustling of leaves in the wind, the incessant and imposing fervor of a waterfall, the delicate gurgling and babbling of a baby and the purring of a kitten may precipitate internal pleasures. Some respond with excitement, some with tranquility, and

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[*] Speech reading is currently used in lieu of "lip reading" as the former connotes that facial expressions, environmental context and auxiliary cues are employed in a total complex where lip movements constitute only one part.

others with complacency. Many of these subjective reactions are socially instilled but others, like music, are more universal. Indeed, music is so universally pleasurable, it is employed as a therapeutic agent. Deafness deprives the individual of this major source of pleasure and in a way imposes a different type of deprivation. The effect of this affective deprivation to personality development is nearly impossible to isolate as a parameter.

II. PSYCHOACOUSTICS

Acoustics is the study of sound. Psychoacoustics connotes how the sound is perceived by the individual and how the individual reacts to the auditory stimulus. The field of psychoacoustics is vast and involves a significant number of subdivisions and ancillary areas. For hearing testing, it is fruitful to study the areas of psychoacoustics that deal with test-stimulus sensitivity of the ear, techniques for presenting the sound stimulus, and the manner of the response. While these areas are a part of psychoacoustics called audition, these do not necessarily represent the entire field of audition. Of particular importance, is the nature of the test stimulus and the sensitivity of the ear. The techniques for presenting a stimulus and the response will be discussed in a later section.

A. Test Stimulus. The sounds that are most commonly used to measure the sensitivity of the ear are called pure tones. These tones have only one frequency as opposed to complex sounds that have several frequencies. The frequency of a tone is the number of double vibrations or the cycles per second (cps) that is produced in a unit of time, i.e., one second (500 cps, 2000 cps, 8000 cps, etc.). This designation has recently been superseded by the term Herz (Hz). Pure tones are especially good for hearing testing as they are easy to standardize universally and can be used to represent the auditory range of hearing. The strength or magnitude of the tone is called the intensity and this is expressed as a logarithmic ratio of two sounds called the decibel. A measure of hearing sensitivity is always expressed at some decibel level or the hearing level for a particular frequency.

Both frequency and intensity are physical parameters of sound. However, in audition, an individual's perception of the sound is important and so the subjective or psychological counterparts to frequency and intensity are slightly different. The former is called pitch and the latter is called loudness. Both pitch and loudness, then, represent the individual's interpretation of frequency and intensity. Although these physical and psychological parameters are related, they are not identical and may not even be parallel in many instances of hearing impairments.

There are several other parameters to sound that are beyond the scope of this chapter but warrant casual mention. One of these is phase. The phase refers to some part of the sound-wave cycle (at any given moment) relative to a reference such as zero degrees. Two identical tones are "in-phase" when a given part of both cycles such as the amplitudes at 90 degrees (or any other reference point) are superimposed. Amplitude is one way to represent the intensity of the sound. In this instance, the two amplitudes will "facilitate" each other. Facilitation and cancellation operate in varying degrees depending on the circumstances. Phase is important for localizing low frequency tones in space and is particularly pertinent to the blind.

B. Sensitivity. The ear is astonishingly sensitive to sound vibrations. When a sound is generated from its source, it radiates wave fronts relative to the frequency. If the wave fronts are "air-borne," then the air molecules are pushed together (condensed) and spread apart (rarefied) in conjunction with the number of sound vibrations. These are known as condensations and rarefactions, respectively. When the undulating wave patterns finally reach the eardrum they are transformed to a mechanical form of energy for transmission along the auditory route to the brain. The wave or spectral patterns of the sound are preserved with remarkable accuracy even though several modifications occur along the transmission route. The eardrum is extremely sensitive to wave patterns in the air and a molecular displacement equivalent to one-tenth the diameter of a hydrogen molecule is theoretically sufficient to induce a response from a sensitive eardrum.

The human ear can resolve sound intensity that has an enormous intensity ratio. It can also respond to a frequency range that extends from 20 Hz to 20,000 Hz. These represent extreme limits obtained from good ears under laboratory conditions. More practically, the ear cannot respond well at the extreme ranges because of the limitations imposed by environmental interference and the reduced sensitivity at the extremes. Actually, the functional hearing range extends from 100 Hz to 10,000 Hz where about 97 percent of speech intelligibility is contained. There is still an even narrower range extending from 500 Hz to 2000 Hz known as the critical speech range that accounts for approximately 70 percent of the speech intelligibility. Good hearing sensitivity in this critical range results in surprisingly good speech intelligibility even though the other frequencies are reduced in sensitivity; the converse is also true.

III. ANATOMY AND PHYSIOLOGY OF THE EAR

There are three major divisions to the ear: the external or outer ear, the middle ear, and the inner ear. Each of these play a specific part in the transmission and coding of the sound stimulus as it first impinges on the outer ear until it reaches the brain. The structure of each part is particularly well suited to perform its function unless some impairment inhibits its efficiency.

A. External or Outer Ear. This consists of an auricle (pinna) and a 1-1 1/4 inch long external auditory canal (meatus) which leads to and terminates at the eardrum. Although the function of the external ear is little more than protective, an occlusion of the passageway due to impacted wax or a foreign body can cause a noticeable loss of hearing sensitivity due to an impedance of the sound conductive mechanism. Fortunately, these are easily corrected by removal of the obstruction.

B. Middle Ear. The middle ear lies between the outer and inner divisions and serves to transmit the sounds from the outer ear to the inner ear. It is separated from the outer ear by the tympanic membrane (eardrum) which is membranous, conical shaped partition that slopes downward obliquely. The apex of the cone-shaped eardrum is called the umbo and connects to the first and largest of three small ossicles (bones) known as the malleus (hammer). The second ossicle is the incus (anvil) and the last of the lever-like chain is the stapes (stirrup). Collectively, these three are called the ossicular chain. While this chain functions as a mechanical lever to increase the pressure of the sound stimulus as it is transmitted from the outer ear where there is a fluid medium, it also serves as a protective device to reduce the extremely high amplitudes of intense low frequency sounds.

The innermost wall of the middle ear cavity contains two windows that lead to the inner ear. The upper window is called the oval window and has the stapes connected to it by a thick band of connective tissue called the annular ligament. As the annular ligament is thicker at one point, the ossicular movements cause a complex rock and roll, piston-like action. Eight middle ear ligaments and two important middle ear muscles, the stapedius and tensor tympani muscles attach to the ossicular chain. These two muscles affect the impedance of the ossicular chain and can be tested clinically to detect a middle ear impairment.

The middle ear cavity or the tympanum normally contains air and occupies a space that is about a half square inch. The air is ventilated and pressurized to the outside environment through the eustachian tube that extends from the floor of the tympanum to the nasopharynx. This tube is normally closed but opens with each swallow. Most middle ear infections in young children are related to a malfunctioning of this tube.

Functionally, the entire middle ear mechanism transforms the airborne sound to mechanical energy, amplifies it and also protects the inner ear from physical insult by contraction of the two middle ear (intra-aural) muscles.

C. Inner Ear. Deep within the temporal bone is a complex series of sacs and ducts called the labyrinth. The excavated bony canals are called the osseous labyrinth and the ducts within them are called the membranous labyrinth. The osseous labyrinth is filled with a fluid called perilymph that communicates throughout its three parts, the vestibule, the three semicircular canals, and the cochlea. Both the vestibule and semicircular canals control balance and respond to gross low frequency vibrations but it is the cochlea which is the peripheral end organ that is responsible for the fine analysis of sound.

The cochlea spirals around a central core of bone called the modiolus giving it a snail-like appearance. This snail-like organ is divided into three tubes or scali. An upper tube, the scala vestibuli and a lower tube, the scala tympani, contain a fluid called perilymph while a middle tube called the scala media or cochlear duct contains a slightly different fluid called endolymph. The scala vestibuli leads to the oval window at the upper basal end and the scala tympani leads to the round window at the lower basal end. Both these scali communicate with each other through a common small opening called the helicotrema which is located at the apical end of the cochlea. The superior portion of the scala media contains a partition called the vestibular or Reissner's membrane which separates the cochlear duct from the scala vestibuli. The inferior portion of the cochlear duct has a partition called the basilar membrane that separates the scala tympani from the cochlear duct. This basilar membrane is a tough resilient membrane upon which rests the organ of Corti on its cochlear duct side. The organ of Corti actually is the mechanism that analyzes the sound. This mechanism basically consists of one row of inner hair cells and three or four rows of outer hair cells. The base of these 23,500 ciliated hair cells are supported by several structures below and a tectorial membrane above. There is a loose contact between the hair cells and the gelatinous-like tectorial membrane that allows for a shearing type action between the two as the basilar membrane is vibrated up and down. It is ultimately the movement of the basilar membrane that causes the hair cells to yield a bioelectric discharge called the cochlear microphonic. This cochlear microphonic is subsequently transmitted to fibers of the auditory nerve where the impulses are converted to nerve impulses called action potentials. The action potentials are then transmitted up the complex network of auditory pathways to the auditory cortex in the brain where the sound is interpreted.

IV. ASSESSMENT OF HEARING

A. Auditory Evaluation. The purpose of a hearing evaluation is to assess the auditory mechanism in its entirety. The younger the child, the more difficult it is to obtain valid and reliable data; nevertheless, it is necessary to get pertinent information as early as possible. A hearing evaluation involves more than just an assessment of auditory reception. Rather, it encompasses the ability to interpret the sound stimulus and perform some kind of overt behavioral task. In essence, then, a hearing evaluation measures more than just the ability of a hearing end-organ to respond to acoustic stimuli, but includes the transmission of this energy to the brain where it is interpreted and transformed into some response.

In dealing with very young children, there are many instances when hearing responses are not elicited but this does not always indicate that hearing is not present. On the other hand, a positive response is usually interpreted that there is some hearing but how functional it is must be explored. Hearing may also be partially defective and the child may not have learned to make use of his residual hearing. In this instance, sound is meaningless and the child may elect to disregard all kinds of auditory stimuli. It becomes a monumental task for the diagnostician to thoroughly assess the hearing and make worthwhile predictions. At the outset, it is prudent to attempt assessment relevant to the degree of loss, locus of the pathology, etiology and age of onset. At some future date other variables are investigated to fill out the total audiologic picture, i.e., intelligence, the language abilities of the child, the social background, the familial sibling relationship, and so on. All these variables affect the development of the child and are crucial to appropriate management.

1. Audiometer. The basic instrument used to test hearing is the audiometer. Basically, it is an electronic audio-oscillator that generates pure tones relative to some reference scale. The usual tones tested with air conduction are 125, 250, 500, 1000, 2000, 4000, 6000, and 8000 Hz. Bone conduction is restricted to 250, 500, 1000, 2000, and 4000 Hz. Each level on the audiometer represents a sensation level or a particular amount of energy above a standard reference level known as the sound pressure level (SPL). This means that the zero level on the audiometer has a different amount of sound energy for each frequency to represent how much the average-normal person needs to give a threshold response at that frequency. The normal ear is

differentially sensitive to the various frequencies throughout the auditory spectrum; the greatest sensitivity is in the mid-range and the least at the extreme ends.

2. Calibration. The calibration of the audiometer refers to the standard to which it is set. Prior to January 1, 1965, the American Standard Association's 1951 (ASA) scale was used, but after this date most audiometers were changed to the International Standard Organization (ISO) calibration scale. The difference between the two scales is roughly 10 decibels but actually it varies at each frequency. The ISO, 1964 scale brings the hearing thresholds into closer agreement with results obtained in recent years under controlled acoustic conditions and better acoustic apparatus.

3. Test environment. Also crucial to the reliability and validity of auditory assessment is that the test environment be acoustically quiet and free of noise. If there is a constant noise in the room, frequencies can be affected with a constant error that would give unreliable results that could easily go unnoticed. It is important, then, that all hearing testing be done in a sound-isolated room and preferably a soundproof room; if bone conduction tests are given, the room would have to be soundproof for accurate results.

4. Sensitivity. Hearing sensitivity connotes the ability of the ear to detect acoustic stimuli at minimal levels. It is assessed for the hearing range with pure tones. The sensitivity of the hearing mechanism ostensibly reflects the integrity of the ear to receive sound and transmit it to the higher centers. Hearing sensitivity is expressed in decibel units relative to a standard source of reference.

Sensitivity levels represent threshold values, i.e., the level where half of the tonal presentations are heard. It is a "detection" point. These low intensity thresholds do not always reveal how the ear mechanism will perform at high intensity levels--a consideration which is pertinent to hearing aid evaluations and auditory training procedures.

5. Discrimination. This denotes the ability of the hearing mechanism to discern the finer elements of speech sounds. Pure tone thresholds contribute information relative to the degree of loss, etiology, and locus of the pathology but they fail to relate information regarding the ability of the ear to actually resolve the finer elements of speech sounds. A typical type of speech material that is employed to test discrimination are monosyllabic words that are phonetically-balanced to represent the sound of the English language in the proportion that they occur in usage. The PB word lists come in groups of 50 words.

Each word is valued at 2 points so a discrimination score is the number of correct words multiplied by two; conversely, the discrimination loss is the complement of this value. Some audiologists prefer to use the latter value.

B. Types of Hearing Tests. There are three major groups of hearing tests:* the first is behavioral audiometry where the subject is trained to give an overt skeletal response when the stimulus is perceived; this constitutes a subjective, voluntary reaction of the individual. In other words, the child or adult is conditioned to provide some kind of behavioral pattern, i.e., raising the hand or throwing a block, when the tone is heard. The second group of tests involve electrophysiologic audiometry. Here the response is picked up by electronic apparatus from some part of the system. It does not require an overt, voluntary activity from the individual. Rather, it reflects involuntary, physiological changes of some part of the neurological or endocrine system to auditory stimulation. Electrophysiologic hearing tests are very often connoted as objective as the individual does not voluntarily participate. The final group of tests involve reflex audiometry. These responses can be gross such as the startle reflex or highly specific like the eyeblink. Either one, however, only gives a crude estimate of hearing sensitivity or how the organism responds to high intensity sounds. Reflexes are innate and only of limited screening value to estimate hearing in the young infant.

1. Behavioral audiometry.

a. air conduction thresholds. Air conduction thresholds can be ascertained by either using earphones or by transmitting the sound through a loudspeaker into a sound field. The latter is used in instances when phones will not be tolerated but are limited as the better ear picks up the sound. Air conduction thresholds reflect the integrity of the auditory mechanism as a functional unit. Each frequency is tested and the hearing level is recorded on a chart called an audiogram. The value recorded represents the threshold level (hearing level) of the individual. The audiogram charts the hearing sensitivity in sensation level values relative to each frequency.

b. bone conduction thresholds. Bone conduction thresholds are tested in essentially the same manner as air conduction thresholds except that the bone oscillator is placed behind the earlobe on the bony mastoid process. The sound now travels through the bones of the skull directly to the inner ear, bypassing the conductive mechanism of the outer and middle ear divisions. The difference between the air conduction and the bone conduction thresholds, the air-bone gap, shows the amount of conductive impairment, if any. If the air and bone conduction thresholds are relatively superimposed, then the air-bone gap is negligible and no conductive involvement exists. If there is comparable loss for both air and bone conduction, then it is designated as sensory-neural. On the other hand, if there is an air-bone gap, then the amount of gap at each frequency indicates the amount of conductive involvement at each frequency. When both the air conduction and the bone conduction thresholds are depressed and there is still an air-bone gap, then there is a mixed loss where both the conductive and sensory-neural mechanisms are involved. In summary, then, in order to estimate the site of the impairment and the type of impairment both air and bone conduction thresholds must be given. Bone conduction testing reflects the crucial difference in the transmission efficiency of the system as the conductive mechanism is bypassed. Bone conduction audiometry is complex as the sound often travels to the contralateral ear (the one not being tested). To keep the sound in the ipsilateral ear (the one being tested) it is necessary to use a masking sound such as white noise. The masking sound preoccupies the contralateral ear so that it does not compete with the ipsilateral ear.

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*This author prefers to employ this grouping of tests, but there are other categorizations that are also used.

c. play conditioned audiometry. In order to elicit responses in the young child there are several kinds of ingenious play devices to motivate his cooperation. A peep show has been devised where the response to a tone, i.e., pushing a button, allows the child to see a fascinating scene. Another technique, the ear choice, requires the child to simply point to the ear with the sound. Many other imaginative and creative techniques have been developed to test children between the ages of 2 to 3 years.

d. speech audiometry. Speech audiometry is difficult with very young children or congenitally deaf children who have not yet developed sufficient language facility to respond appropriately. There are, however, simple bisyllabic words called spondees which can be used to ascertain the speech reception threshold of these children. The speech reception threshold denotes the intensity level where speech must be given to "recognize" 50 percent of the words correctly. It is slightly higher than the pure tone threshold levels which only require "detection" and do not involve word recognition. There is a relation, however, between the pure tone average (PTA) at 500, 1000, and 2000 Hz and the SRT so that the former is often substituted for the latter in instances when speech tests are not practical.

Still another type of speech test is to test the word discrimination ability. Here, monosyllabic, phonetically-balanced

(PB) words are given at "comfortable listening" levels and a percentage score is ascertained. This score ostensibly reflects how well the ear can discern the finer elements of sounds and words. Each word list contains a representative sampling of English sounds and in the same proportion that may occur during normal conversational usage. These scores are particularly important for rehabilitative techniques, i.e., fitting hearing aids and auditory training but have very pertinent diagnostic implications.

e. localization tests, recruitment tests, etc. There are a significant number of special tests that can be used to test the person's ability to localize sound in space and this is particularly important with blind adults. There are also tests for measuring recruitment and other kinds of auditory phenomena related to hearing impairments. These tests are beyond the scope of this chapter here.

2. Electrophysiological audiometry. There are two major "objective" electrophysiological procedures that have been employed with children and adults. Basically, these tests are used for children who are unable to cooperate and provide subjective, voluntary responses. The response is recorded electronically from some part of the organism:

a. electrodermal audiometry (EDA). This technique has previously been called the galvanic skin reflex (GSR). Changes in fluid secretion mediated by the sympathetic branch of the autonomic nervous system is recorded as the response to the sound. The subject has to be "conditioned" to fear the tone so the EDR response will be maintained. This is accomplished by pairing a tone with a shock so that the two are associated or perceived as occurring together. The shock produces a "fear" or a stress condition that causes an increase of perspiration output with each shock presentation. The increase in perspiration causes more current to flow through the electrical circuit which is registered as the electrodermal response. Once a subject associates the tone with the shock, the latter is eliminated and the tone is given alone. EDA is particularly good with young children who cannot cooperate with other procedures. Its major limitation is its lack of validity on very young children, brain-injured children, mentally retarded children, cerebral palsied children, and emotionally disturbed children.

b. electroencephrolgraphic audiometry. This technique involves recording wave pattern changes directly from the head with electrodes. It is at best a crude test of hearing but gives some indication of the amount of hearing sensitivity. It is a test given during sleep and the brain wave patterns represent involuntary or objective responses. It involves elaborate equipment and highly skillful technicians and is presently limited to relatively few audiology centers.

3. Reflex audiometry. In this category are the innate, involuntary, physiologic reactions of the organism to an auditory stimulus. They are basically for infants below the age of one year. In many instances, they provide a yardstick to estimate whether a child has partial hearing.

a. startle or moro reflex. This refers to the undifferentiated or diffuse, startle reaction that infants often give when frightened in general. Extremely loud sounds in particular cause this reaction. The test is typically given with a 3000 Hz noise at several sound pressure levels, i.e., 80-110 db. It is a screening technique for estimating the hearing in the young infant and at best is only a crude estimate.

b. orienting reflex (OR). This refers to the innate tendency to "localize" or look toward the source of sound. It can be used as an indication that the child can localize sound and furthermore has symmetrical bilateral hearing.

c. auropalpebral reflex (APR). The auropalpebral reflex in common parlance is the "eye blink" that occurs to loud sounds. This innate reflex occurs even if the eyes are closed as a sudden tightening of the already closed lids. Again, it is crude and indicates that the organism only responded to an extremely loud sound. Its absence is not always indicative that hearing is absent or even defective but rather that the auditory mechanism has not reacted to this stimulus at that particular time.

There are several other kinds of reflex techniques that have been employed such as the middle-ear muscle, etc., but they would be beyond the scope of this chapter.

C. Hearing Aid Evaluation. The hearing aid evaluation on the young child is quite difficult. With the adult, sophisticated techniques can be used but with the child this is not possible. With the child, it is the audiologist who is relegated the responsibility of an appropriate fitting. He must decide whether the fitting should be monaural or binaural; in many instances it is better to leave one ear unoccluded if some useful low tone hearing is available. On the other hand, binaural hearing is essential for deaf-blind people for their localization orientation in space.

D. Testing Blind Children. Blind children do not require any special testing techniques other than those described above for other children. The blind-deaf certainly cannot be conditioned and reinforced with visual techniques but here vibrotactile reinforcement is emphasized. In many instances, the young child is allowed to hold a bone oscillator in his hand with the intensity turned high so that he can feel the vibration. He is then conditioned to respond to this gross vibrotactile stimulation which is then generalized to auditory stimulation. Blind children, in general, are responsive to sound and are easily conditioned under most circumstances. The techniques used for other children are simply modified and brought within the domain of their maturation levels.

V. DISORDERS OF HEARING

A. Types. There are basically four types of hearing disorders. The first two are peripheral impairments and the second two involve central processes, i.e., conductive, sensory-neural, central, and psychogenic. As central impairments constitute language problems such as the interpretation and integration of auditory perceptions they will be considered in the speech section. The psychogenic problem is actually not a "loss" of hearing per se, but rather a subjective rejection that the hearing mechanism is functional. In this chapter only peripheral hearing loss and concomitant problems will be reviewed as they relate to blindness.

1. Conductive impairments. A conductive hearing loss can be caused by a malfunctioning of the external or the middle ear conductive mechanisms or both. Usually, there is a blockage or an impedance of the sound as it is being transmitted to the inner ear. Generally, this type of loss does not exceed 70 db (ISO, 1964) and more typically is of mild to moderate severity. Conductive hearing loss is very often amenable to medical and surgical correction so that the problem is often reversible. In conductive loss, the air conduction thresholds typically yield a flat configuration or show poorer hearing in the low tones and better hearing in the high tones. Bone conduction thresholds are within normal limits indicating that the cochlea is not involved.

The speech reception threshold in a conductive loss is usually commensurate with the air conduction pure tone average (PTA) for 500, 1000, and 2000 Hz. Discrimination scores are typically high and the person is able to utilize amplification well. There is also an increase in tolerance for loud sounds as the threshold of discomfort has been raised slightly due to the attenuation effect of the hearing loss. Very often these people speak in a soft voice simply because their bone conduction is normal and they are able to hear their own voices at a normal intensity level, while the environmental sounds are attenuated by the amount of hearing loss as depicted by the air thresholds.

2. Sensory-neural hearing loss. Sensory-neural hearing loss refers to an impairment of the cochlea (sensory), the auditory

nerve (neural), or its retrocochlear pathways. Not infrequently, people have combinations of cochlear and retrocochlear lesions. The air conduction configurations with sensory-neural involvement can assume almost any possible shape. Some are so complete that there is no hearing at all, some have U-shaped curves, sloping high frequency curves that show increasingly poorer hearing as the frequencies ascend from low to high. The configuration very often relates to the etiology and the type of loss.

People with sensory-neural impairments typically give speech reception thresholds that may be poorer than the pure tone average (PTA) and almost always show discrimination difficulty. With cochlear pathology there is somewhat of a relation between the level of the speech reception thresholds and the discrimination scores while in auditory nerve and retrocochlear lesions there is a disproportionate discrimination loss than would be predicted from the pure tone thresholds.

A combination of conductive and sensory-neural impairments is called a "mixed" loss. Not infrequently people will have a combination of the two. A conductive loss in one ear and a sensory-neural loss in the other ear is not considered a mixed loss; rather both types of impairment must occur in the same ear. With a mixed loss, both the air and bone thresholds are depressed but the air-bone gap is retained to some degree. There will also be varying degrees of configurations, reception thresholds, and discrimination scores depending on the involvement.

B. Etiologies of Hearing Impairments.

1. Conductive.

a. otitis media. This is one of the most common causes of middle ear hearing loss in young children. Quite often the eustachian tube becomes infected and as a result the normal pressure and ventilation changes are deterred. Subsequently, a vacuum occurs within the middle ear cavity which results in an effusion of fluids from the surrounding structures into the void. If the fluid is clear and not infected, it is a purulent otitis. When an excess of fluid accumulates in the middle ear, the eardrum may puncture to relieve the fluid pressure. The degree of hearing loss associated with otitis media depends on how acute or how chronic the condition is and several other factors. The accumulation of a thick fluid in the middle ear often causes a "glue ear" as the ossicles become fixed from fluid deposits. The treatment involves drainage, antibiotic therapy or surgery.

b. otosclerosis. This progressive disease of the otic capsule apparently manifests itself in the early teen years. There is some reason to believe that the histologic changes begin at a younger age but the clinical symptoms of hearing loss show up at a later age. There is an accumulation of spongy embryonic cells that eventually become replaced by a sclerotic bone; the major site is the area where the stapes fit into the oval window. Through the years a series of surgical procedures were used to correct this impedance (the fenestration and mobilization operations) but the most successful and enduring has been the stapedectomy operation where part of the ossicular chain is reconstructed and functioning restored.

c. atresia. Atresia refers to a congenital malformation of the middle ear. It is usually hereditary and can affect any part of the middle ear or inner ear divisions. Usually, there is little that can be done medically or surgically but in some instances surgical treatment has been successful.

d. mastoiditis. Mastoiditis is an infection of the mastoid cells but since the advent of modern antibiotics it has become almost defunct as an otologic problem. At one time it required extensive surgical procedures that was accompanied by permanent hearing loss.

e. cholesteatoma. This is a tumor that affects the temporal bone and very often projects into the middle ear. It can cause any degree of middle ear hearing loss. Therapy depends on the location and extent.

f. trauma. Physical abuse can affect any part of the conductive mechanism and in varying degrees. Most often the eardrum is punctured by loud sounds or the intrusion of a foreign object. Therapy depends on the specific damage.

2. Sensory-neural etiologies. There are a large number of causes of cochlear, eighth nerve, and retrocochlear pathologies but only the more significant ones will be described below:

a. Meniere's disease. This is a disease caused by a hypersecretion of endolymphatic fluid within the cochlear duct. Another name for it is endolymphatic hydrops. Apparently, the mechanism that regulates the fluid is defective but the nature of this mechanism is not clearly understood. There is a classical triad of symptoms, i.e., deafness, vertigo, and tinnitus. The hearing loss results from damage to the hair cells of the cochlea, at times the tectorial membrane, and often other structures in severe cases. In the early stages there is a greater loss for the low frequencies than for the high frequencies but as the disease progresses, the high frequencies become progressively worse. Eventually, there is a marked hearing loss for all frequencies that is permanent. The SRT is usually not predicted accurately by the pure tone average and this is severe discrimination problems associated with the hearing loss.

b. noise-induced hearing loss. This occurs from an abundance of excessive noise over a prolonged period of time. When the loss occurs suddenly, it is called acoustic trauma and may also involve the conductive mechanism. If the loss progresses gradually over a prolonged period of time, it is usually referred to as a noise induced hearing loss. Thresholds can vary markedly depending on a number of variables, i.e., the noise level, the frequency spectrum, susceptibility of the ear, intermittency, etc. The hearing thresholds may reflect temporary threshold shifts (TTS) that suggest an auditory fatigue; these threshold shifts will vary from day to day. Eventually, a permanent threshold shift (PTS) evolves and this is called the noise-induced hearing loss. Discrimination is adversely affected in many instances.

c. toxemia. There are several poisons that can affect the hearing mechanism and cause hearing loss. Some of these are arsenic, quinine, and various antibiotics such as streptomycin, dihydrostreptomycin, kancmycin, neomycin, etc. Hearing losses can vary from mild to severe and with accompanying degrees of discrimination loss. Usually losses affect the high tones most but there is significant loss to the low tones as well. The effects of the drugs are cumulative and further deterioration subsides when the drug is stopped.

d. viral infections. Any number of viruses can cause hearing loss. The more common ones occur from measles, influenza, mumps, and many other childhood diseases. High fevers are often associated with viral infections that can be detrimental to the hair cells of the cochlea. Hearing thresholds can vary from mild to marked with concomitant discrimination loss and other auditory problems. Unilateral hearing loss often occurs with these etiologies; in fact, mumps is the most common cause of unilateral loss.

e. hereditary deafness. It is estimated that nearly half of the deaf children enrolled in schools for the deaf have hereditary deafness. Usually, this hearing loss is quite severe but in rare instances it may just be a mild loss involving the high frequencies. There is no immediate treatment for this etiology.

f. presbycusis. This refers to hearing loss that naturally occurs with advancing age. It can affect both the sensory-neural mechanism and even the middle ear. Quite often the ability to discriminate sounds is much worse than the threshold shift for pure tones. Typically, the high tones are affected first but as the loss progresses, the low tones become involved.

g. kernicterus. This is a pathological disease caused mainly by erythroblastosis. Apparently, this condition causes an excessive secretion of a chemical called "bilirubin" which damages parts of the basal ganglia. Generally, it is contended that the hearing loss is retrocochlear but many authorities assert that there is also cochlear damage. The hearing problem may manifest itself in any type of auditory configuration. Very often there is a concomitant loss for discrimination and the integrative abilities needed to interpret sound.

C. Symptoms. A hearing loss is often accompanied with concomitant problems that may be related to the hearing loss or occur along with it because of a common etiologic agent:

1. Tinnitus. This refers to the various noises such as roaring, buzzing, hissing, and so on that people often describe they hear. Some of these sounds are continuous and some intermittent. They may occur in the ear, the head or both. Tinnitus occurs in both conductive and sensory-neural loss although it is more commonly found in sensory-neural impairments. It can even be related to extreme nervous tension. There is little or no therapy for this condition.

2. Paracusis Willisi. In this condition, the hearing seems "better" in noisy places as opposed to quiet environments. One reason is the tendency to talk louder when there is a noisy background which results in an improvement in the ratio of the speech level to the noise level, i.e., an improvement in the signal-to-noise ratio (S/N). Hence, the person receives the speech signal at a louder level and ostensibly hears better. Paracusis Willisi occurs only with conductive hearing loss.

3. Recruitment. This is a symptom that refers to a nonlinear and disproportionate increase in the loudness sensation to equal intensity increments beyond threshold. In other words, the loudness and the intensity functions do not run parallel. Recruitment is found typically in cochlea lesions but in some instances it may be present in neural pathologies; the latter, however, is questionable. The symptom is such that there is a hearing loss at low intensity levels, but at high intensity levels, the loudness perception seems to indicate that the hearing loss has "regressed." In other words, a threshold of 60 db at 1000 Hz indicates loudness detection is at this level but at 80 db the individual may have a loudness sensation comparable to a normal ear at 80 db. In other words, the 60 db tone of the defective ear was equal in loudness to a 0 db tone on a normal ear. At 80 db the defective ear loudness perception equals that of the normal ear.

Recruitment can present a problem when fitting hearing aids as there is often considerable distortion associated with the accelerated build-up of loudness. Although poor intelligibility is not related specifically to recruitment they often occur together. This makes hearing aid fitting more precarious, but nevertheless many people with recruitment do very well with amplification.

Recruitment also imposes a tolerance problem to loud sounds because of the rapid building of loudness sensation.

4. Discrimination loss. This refers to a loss in the ability to discern the finer elements of the sounds. This is found mostly in cochlea and retrocochlear lesions where the cochlea and auditory pathways are involved. It can markedly affect the communicative ability of the individual and is a parameter of crucial significance.

5. Phonemic regression. This is a loss in discrimination that is affiliated with presbycusis. In this instance the air conduction thresholds are relatively good, but discrimination scores are extremely poor and disproportionate to what is expected from examining the air conduction thresholds. It suggests some kind of retrocochlear deterioration and may be severe enough to cause serious problems in hearing aid selection.

VI. RESEARCH AND AUDITION WITH THE BLIND

A. Sensitivity. A self-perpetuating myth flourishes that the blind possess or develop superior abilities to detect and resolve sound with greater facility. Some consider it superior "acuity," others attribute this uncanny ability to some "compensatory" mechanism while still others contend there is less sensory competition from vision so that greater "concentration" is responsible. Undoubtedly, there is some validity to some of these conjectures. Indeed, the blind do learn to make more efficient use of their hearing in much the same way that a trained musician perceives more details in a musical score than a lay listener. He hears tones and subtle rhythms the lay person insists are not present. With sufficient training, the discerning ability of the auditory mechanism becomes markedly improved and more efficient through compensatory adjustments. Concentration, too, is important and sounds usually suppressed into the background are maintained in the foreground as information-bearing elements.

One of the earliest studies dealing with sensitivity was performed by Hayes (1933) who reported that the blind had better hearing acuity and better perceptual interpretation of auditory cues than hearing subjects. Although this study has often been quoted, it has never been corroborated. Since the Hayes (1933) study, a number of others, i.e., Lowenfeld (1955), Axelrod (1959), Hartlage (1963), Burlingham (1964), Neff (1965) have studied the sensitivity of the blind and found they were not superior to their hearing counterparts; in fact, in some instances the basic hearing sensitivity was not quite as acute. In summary, then, there is no evidence to support the premise that blind people have superior auditory acuity.

B. Localization. The ability to locate an auditory stimulus in space is called localization. This ability requires binaural (dichotic) hearing where two separate auditory channels are functioning independently but integrating and fusing their incoming signals. Two major parameters are responsible for this ability, i.e., intensity and phase. The intensive parameter is critical for the high frequency tones where the head serves as a baffle to sounds with short wave lengths. The other parameter, phase, is particularly important for localizing low frequency tones which have longer wave lengths; here the temporal pattern can be used to localize sounds. Complex sounds (as opposed to pure tones) are also spatially localized by interaural phase difference and amplitude ratios. Actually, complex sounds are more easily identified in space because their complexity adds redundancy and subsequently more information. There are more localization errors with pure tones as the frequency increases until about 3000 Hz, after which there is a steady decline in errors.

Spatial localization is highly crucial to the blind as mobility is so dependent on this ability. Even part of "obstacle interference" perception is related to the localization facility. Mobility, then, a cardinal index of social independence and success with the blind, is heavily dependent on this ability.

Hayes (1935) and Moguendovitch and Kalm (1935) reported that the blind localized better than their hearing counterparts. Bernovits (1936) confirmed this observation but attributed the superiority to "unconscious practice." Norton (1959), too, found training enhanced certain aspects of this "acquired skill." Current research fails to support contentions that the blind exhibit superiority in localization. The blind need good binaural hearing (Bergman 1965, et. al.) so that appropriate intensity and phase interactions between the two ears can occur. A loss in one ear disrupts the binaural balance and is particularly detrimental to the blind (Carroll, 1961). Actually, Bergman, et. al. (1965) and Rusalem and Schiller (1962) have advised that localization test should be made an integral part of all hearing tests for the blind.

Obstacle perception has been studied by several investigators. This phenomenon, too, is related to the localization of objects in space. One major criterion needed to perceive the presence of objects is pitch and the manner in which it changes (Meyerson, 1957; Raskin, 1962). Cotzin and Dallenbach (1950) reported that the frequencies above 1000 Hz were most useful. Phase and intensity, too, are involved with sounds that reflect off obstacles. All these subtle cues add their bits of information and a trained listener learns how to interpret the data. It is not unnatural, then, for a blind person to excel in the capacities that are necessary for this skillful performance. To foster this ability, Bergman et. al. (1965) emphasized the need for binaural hearing aids with the blind and outlined training programs that included auditory training, localization practice, selective listening, sound reflection interpretation, etc.

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OPHTHALMOLOGICAL EXAMINATION

Joseph Frank, M.D.

The multiply handicapped child coming for ophthalmological examination on referral from the Syracuse University team nearly always has one or several visual abnormalities. He is frequently anxious and presents a behavioral problem which can seriously inhibit the examination. Parents usually accompany the child and their anxiety is frequently reflected in the child's behavior. Because of this, careful attention must be paid to many details of the physical environment as well as to the examiner's behavior.

A comfortable office should be available where all persons may be seated. Well appointed interiors that include drapes and paintings are much in preference to the more sterile, clinical type examining room frequently found. Projection equipment and other instruments should be stored but readily available to the examiner. Rheostatic control of room light is advisable, especially for children who are visually distractable and need to have testing materials with a greater stimulus value in order to hold their attention.

The examiner's personal approach to the child is important. He must remain calm, even though the child is hyperactive and frequently aggressive in his behavior. Rapid movements, hasty presentation of test items, and signs of nervousness on the part of the examiner are noticeably reflected in the child's behavior. Hints can be obtained from observing the child as he becomes oriented to this new environment. Any signs of interest in materials or in the examiner should be capitalized on so that a maximum of rapport can be established before more formal examination is attempted.

Frequently the parents accompanying the child can aid the examiner in the initial contacts. Their comments about favorite toys and interests of the child may be used to establish this initial contact. Frequently, if they hold the child, this alone provides an adequate feeling of security so that the formal examination may be conducted.

Silence may be frightening to a child even if his development is such that he does not understand words. It is often advisable to carry on a constant monologue with the child even though no verbal response is expected. Some reward value is projected by various words and changes in the tone of voice. The examiner must be careful so that his voice does not connote anger or irritability.

Any sudden movements or intense stimuli, such as bright lights or loud noises, may disturb a child enough so that further examination will be impossible. The introduction of materials should be done with caution and an explanation should accompany such introduction. If the child is allowed time to touch materials and manipulate them himself, then many of the examiner's problems will be minimized. Observation of the child in these situations frequently gives additional clues to his visual ability.

There are several types of reward which may be of value in gaining cooperation and assuring maximum motivation on the part of the child. The physical reward of candy is sometimes useful. Verbal rewards, such as, "Very good" may also be of value. Care should be taken here, however, since some children react negatively to such statements. A comment to the parent to the effect that the child does something quite well will oftentimes have a more beneficial effect on the child's behavior than a direct comment to him. Another category which may be considered as reward has already been inferred--the examiner may allow the child to handle some equipment and to even imitate some of the procedures on the ophthalmologist. Such simple rewards as these will frequently bring unexpected results and lead to a significant modification of the examiner's original impressions.

HISTORY

Much valuable information can be obtained from an accurate and carefully taken history of the child's general development. This is an important step in the ophthalmological examination and can give valuable clues as to progressive visual changes and the adequacy of medical supervision throughout his life. It is also useful as a beginning toward estimating the child's visual acuity. Generally, parents cannot be specific about what the child is seeing, but if they are asked particular and specific behavioral questions, adequate responses may be obtained. This also allows for evaluation of parents' ability to perceive their child as one who has a handicap and sometimes gives valuable insight into their attitudes toward this handicap.

EXAMINATION

A complete eye examination of every child having or suspected of having some defect in the visual apparatus is indicated. Age need not be a limiting factor for a reasonably satisfactory examination can be performed at any time after birth. Several office visits may be required to complete the evaluation. Nothing more than gaining a child's confidence may be accomplished during the first two or three sessions. If patience and understanding are the basis of the relationship, the child will usually look forward to the office visits with pleasurable anticipation.

There is no universally satisfactory method in checking visual acuity. We must always bear in mind that we are also testing many other capabilities such as ability to cooperate, follow instructions, concentrate, turn the eyes, etc.

The methods used to check a child's vision are limited only by the examiner's ingenuity. The most common methods used are:

A. Letters and numbers
B. Illiterate E
C. Lanholt Rings
D. Symbols--house, dog, etc.
E. Small objects as beads, etc.
F. Counting of fingers
G. Hand movements
H. Light perception

If possible the vision should be checked both monocularly and binocularly.

Much information about visual acuity can be gained from a careful history from parents and associates.

The final assessment of a child's visual impairment depends not on the results of any of the standard tests but rather on his ability to perform. Many children will check no better than 20/200 or 20/100 on the distance-Snellen Chart--yet with good light can read the smallest print at a distance of six or seven inches.

Many of the problems in the multi-handicapped child are perceptual and it is often difficult to determine the percentage of visual impairment or perceptual impairment.

A complete eye examination is a must for every child presenting a visual problem. With patience, kindness, and understanding almost all children can be satisfactorily examined in the office. However, lack of cooperation is no excuse. Force should never be used on children. If a satisfactory examination of the interior of the eye cannot be attained due to severe nystagmus or poor cooperation, very little more will be accomplished by physical restraint. The use of sedatives or general anesthesia may be indicated. With trained personnel, modern anesthetics, and in a well equipped hospital, there is very little risk and the benefits of appropriate correction and the appropriate visual training program will be considerably greater.

New or strange instruments will usually alarm a child. Whenever possible, use some object with which the child is acquainted such as a flashlight, pencil, or doll to attract his attention. Frequently it is better to occlude an eye by using a thumb, hand, or index card instead of the plastic occluder. Again, it is important to stress that new instruments should be introduced gradually and if possible the child should be allowed to examine them before use.

Every analysis of the child's visual ability must also include a cycloplagic refraction. Under "drops" a capable refractionist can determine the refractive error and prescribe the proper glasses at any age without the need of asking questions with this technique. The examination is entirely objective and may even be performed while the patient is under general anesthesia.

MOTIVATION

There are frequent indications that handicapped children with visual losses do not efficiently use the residual vision they have. There are several reasons for this. On some occasions, the child may not have adequate mental ability to realize that he can more effectively use his visual ability. More frequently, though, other factors are prominent as causative agents. A child who has been labeled "blind" suffers from the stereotype of blindness as defined by parents and other persons who interact with him. If they perceive blindness as total and complete loss of vision, then there will be a tendency to help the child use his hands which, in effect, makes use of vision a non-rewarding experience. Children receiving this treatment will frequently become more and more dependent upon their tactile and auditory senses and will not attempt to use their visual ability. There are some times when a child learns to use his other senses so efficiently that it becomes uncomfortable for him to try using the visual modality. At these times it is necessary to stress the value gained from using sight and to make it more convenient to look than to listen or feel. There are other times when a child will not wear corrective lenses because they tend to be uncomfortable and may severely restrict the visual field. The correction may allow for much better acuity on specific target objects such as print, but it may decrease the peripheral fields so much that the child does not get information in a manner which is satisfactory to him. This condition is frequently noted in aphakic children who have not been pushed toward wearing corrective lenses. Another factor may be related to the child's self concept and what he perceives as an adequate individual when the wearing of corrective lenses is involved.

Frequently a lack of motivation to use visual ability may be associated merely with the child's lack of experience in various environmental situations. If he has never experienced the joy of visually perceiving various objects, then it goes without saying he has difficulty in putting forth the necessary effort to see materials which he knows as only tactile or auditory sensations.

It is important to realize that when a child has adequate ophthalmological supervision and has received sound visual experiences, then good results may be obtained from his visual ability. The goal here is to achieve maximum visual efficiency. It must be realized that this cannot be accomplished by an ophthalmologist alone. When one is concerned with modifying functional behavior, then it is also necessary to involve other specialists, particularly the psychologist and educator. This also takes much consideration on the part of the parents and the school systems. It may be said that without such cooperation, minimal results, if any, can be obtained.

DUTIES OF THE OPHTHALMOLOGIST

The primary duty of the ophthalmologist is of course to complete as adequate and accurate an eye examination as is possible at this time in the child's life. This should lead to at least a tentative diagnosis on the condition and the etiological factors involved. Again, it is important to state that there is no excuse for not carrying out a complete eye examination as outlined above. If this cannot be done in one session, then appropriate time should be allotted for completing the examination under satisfactory conditions in a manner which assures the validity of the results.

The examination also includes a statement on the visual ability at the time of evaluation and some estimation of visual potential. This statement must also include an outline of treatment programs and enough specific detail to allow for accomplishing this treatment through designated professional specialists in both medical and non-medical professions.

The importance of counseling with the parents of the patient cannot be underestimated. Frequently, parents cannot organize their thoughts well enough to ask questions during the initial examination. This makes it important to realize that they will have questions at a later date and time should be arranged for their consideration. From these questions it will also be possible to determine the degree to which other professionals are involved and for making appropriate arrangements to talk with them about the child's visual condition and the ophthalmologist's role in the future treatment program.

POINTS TO BE STRESSED

There are several issues which occur often enough in routine contacts with parents to be mentioned again here. It seems that these factors are often the basis for committing extensive amounts of energy and money. All too often the results of the inappropriate commitments are insignificant.

The eye cannot be injured by use. This is even true when inadequate correction is prescribed or when lenses will not be worn by the child. Visual efficiency may be decreased by poor correction, but the eye will not be injured. Children often report headaches after prolonged visual concentration. These are most commonly caused by the muscular effort needed to focus the eye or to converge both eyes on the stimulus object. It is not due to any deteriorating process or "wearing out" of the eye apparatus. The fact is that visual ability is increased with use and the more a child learns to look, the more he will perceive. Corrective lenses can only make a child see things more efficiently. They do not alter the normal or abnormal progression of physical change within the eye. This statement of course does not apply to problems encountered with ocular muscle imbalance which need treatment by corrective lenses and other prescribed techniques such as patching and surgery.

When a child holds an object close this does not injure the eye in any way. It merely increases the retinal image size and in this fashion seems to improve vision. If left alone the child will hold objects where he sees them best.

Most visually handicapped children do not benefit from large print. They should be started on the print size normally used for the age group. If difficulty is experienced then one variable to be examined may be print size. Psychological needs must be carefully considered here as well as the physical problems involved in developing and maintaining a bulky and expensive library collection which has limited positive value and quite likely some negative factors to consider.

It is important to realize that intensity of illuminations for maximum visual efficiency is a highly individual matter. Extensive amounts of light are not harmful. Neither is insufficient illumination even though many advertisements would have us believe that some dire consequences may be expected if a child does not have sufficient illumination. Appropriate lighting can improve visual ability. Glare can be annoying and can reduce the ability to perceive detail. Low intensity illumination can also be annoying so careful attention must be given to each child's illumination needs for various situations.

All colored glasses reduce the amount of light entering the eye and consequently reduce vision. In some cases, such as albinism or aniridia, tinted lenses are indicated. It should be stressed however that unless this is a definite indication such lenses should not be worn.

Finally, the use of subnormal visual aids has been of use to some individuals. Care must be taken in prescribing these however and several factors must be considered before success may be predicted.

Motivation is especially important. Unless a person really works at learning to use these lenses and unless he wants to see something which he cannot see at present, success cannot be predicted. This is an especially important factor with multiply handicapped children. It is frequently impossible to evaluate the motivation to see. If it is low, then much of the treatment program must be derated to altering this rather than, or in conjunction with the visual correction.

NEUROLOGICAL EVALUATION

A. William Wright, M.D.

The recognition, diagnosis, investigation, and treatment of disease and dysfunction of the nervous system constitutes the primary responsibility of the neurologist. The student of the nervous system must be well versed in the manifestations of normal and abnormal nervous system function at all ages and under many varying circumstances. The assessment of motor, somatic sensory and reflex neurological function falls almost exclusively into the sphere of the neurologist. The application by the neurologist of his special knowledge and skills to the valuation of areas such as behavior intelligence, vision and hearing provides an independent, nervous-system-oriented assessment in areas which are also evaluated, albeit from a different viewpoint, by the psychiatrist, psychologist, ophthalmologist, and otologist.

Often the inability of the patient to cooperate and communicate leaves great gaps in one's knowledge of the neurological status. Careful history taking, special examination techniques, constant awareness of what has and has not been adequately determined, and serial examinations with special attention to critical areas will narrow these gaps.

From the therapeutic standpoint static deficits will require special diagnostic and therapeutic measures.

The following neurological reports provide a cross-section of the children under discussion. They describe deaf-blind children with various levels of intelligence, a variety of beneficial and detrimental home environments, and children whose behavior has been affected by disorders in all spheres mentioned above. These reports illustrate some of the problems of the neurologist in evaluating deaf-blind children and some of the problems of the children themselves. The relation of the neurological report to other examinations by other members of the team will be found in the case study at the end of the manuscript.

The neurologist's method of case study is documented in the attached list of references.

CASE HISTORY

Case #1: Intelligent, 12-year-old girl, blind, deaf, understandable speech, uses vibration method for lip reading. (RLF)

Neurological Examination

I saw E--- for neurological evaluation in connection with the multi-disciplinary approach to handicapped children conducted by the Center for the Development of Blind Children. E---'s major problem has been virtually complete deafness and blindness. The former is of unknown cause, the latter attributed to retrolental fibroplasia which was apparently due to her being kept in an incubator under oxygen treatment for two to three months after her premature birth. She was born early in the seventh month of her mother's first pregnancy and weighed only three and a half pounds. She walked at about age two and a half years, was trained at about age three and a half, was able to dress herself at about the age of five years. She was started in a special program for the education of deaf-blind children at age four and is still in the same school. She is described as having been hyperactive or hyperkinetic in the early years, but was able to learn quickly and well and has learned to speak by using the vibration method, and to write braille and has gained some facility in calculations. She read back for me a letter which she had composed and written in braille. Her speech is a bit difficult to understand but if she goes slowly she can be understood and the sense is there.

On examination, her mental status is difficult to test or evaluate since there are no norms for deaf-blind children. But this seems essentially within the normal range considering the marked deficit that she has in the important areas of vision and hearing. There was bilateral microphthalmia with cloudy corneas and apparently no useful vision. She did not react to a loudly vibrating tuning fork until it touched the hair near her ear or the skin, when she did react and promptly. The head circumference is 53 cm., which is average for her age. There was no evidence of facial weakness or sensory loss and the jaw jerk and snout reflexes were normal. The deep tension reflexes were more active in the lower extremities than in the uppers but the plantar responses were flexor. She walked carefully, maintaining her center of balance carefully above her feet, and groped. In view of her blindness, her gait was not thought to be abnormal. She was able to manipulate small objects well and no weakness was found. There was no evidence of cerebellar dysfunction. Sensory testing disclosed normal sensibility in every respect. Cortical sensory functions were intact, if not supernormal. Her two point discrimination was exceptionally good. She concentrated well and her attention was easily obtained.

E--- is a deaf-blind child. Except for this important deficit, central nervous system function seems within normal limits, with the exception of the very quick lower extremity stretch reflexes. Detailed psychological studies are certainly indicated, as is also a search for the cause of her hearing loss. I would like to see her again if she returns for re-evaluation.

CASE HISTORY

Case #2: Eight-year-old girl, average mentality, useful vision, severe hearing loss, visual-perceptual problems, no speech. (Rubella)

Neurological Examination

I saw L--- for neurological evaluation because of visual and auditory deficits and suspected neurological abnormality. She is the oldest of five children. The others all seem to be normal. Her mother was thought to have had German measles in the first month of her pregnancy when she was carrying L---.

L--- was born with cataracts bilaterally which were operated upon at age 8 months, and again later on, with an excellent surgical result. With strong, thick lenses she seems to have relatively useful vision. Impairment of hearing has been suspected since early in life and special tests have been done, but these have apparently been difficult to interpret. She frequently seems inattentive or unresponsive or unable to hear sounds.

L--- has never been able to communicate very well, certainly not through speech. She does not say any words, but she does grunt and grimace. She has dressed herself since about the age of five but cannot tie her shoelaces. A year ago a psychological evaluation estimated her mental age at three years, 0 months, equivalent to an I.Q. of 40 on the Leiter International Performance Scale. On my examination I noted no speech but she does point to herself when I look at her wristwatch. She seems afraid of me on occasion. The head circumference is 47.25 cm. which is definitely small, being below the 10th percentile for a three year old. The shape is not unusual. She is able to see a tiny white pill on the white sheet of the examination table with either eye when she is wearing her thick lenses. The ocular globes seem small bilaterally. The confrontation visual fields seem full, but I was not able to see the fundi due to the constant movement of her eyes, a pendular nystagmus. The pupils were equal and reacted to light. They were small without keyhole deformity. The range of movement of the eyes seemed normal. The jaw jerk was brisk. I was unable to reach any conclusion about her hearing. Facial sensibility seemed normal and, as mentioned above I noted no speech. No distinct abnormality of motor function was noted. Her tone may perhaps be slightly diminished but this is not striking. The reflexes were all normal and the plantar responses were flexor. Sensory testing was unsatisfactory, except that she was able to feel a pin prick on all extremities. I noted no birthmarks.

The clinical picture is entirely consistent with damage in the pre-natal period by rubella infection. I think that her major deficit is in the sphere of intellectual and auditory function, and that the visual impairment is less of a problem. I will be interested to see Dr. N---'s opinion regarding her hearing.

Summary of Psychological Report

L---'s primary disability is deafness; she can function as a seeing child. However, because if impaired visual-perceptual integration, not related to visual acuity, she could encounter special problems in reading visual cues. Although previously reported psychometricdata, as well as some present results imply severe mental retardation, the interpretation of these findings must be modified for the multiply handicapped person. Most of the test items that she failed below her chronological age level relate to oral expression or to activities depending upon skill in abstract verbal, symbolic expression. Her highest success referred to doing simple household chores and self-help in eating and dressing. Considering her learning in the social and self-help areas, it is the examiner's impression that after a period of appropriate instruction, L--- could function as an intellectually low average child. Among her assets are good social sensitivity and responsiveness, skill in housework, interest in her environment, ability to relate to other children and realistic parental attitudes.

CASE HISTORY

Case #3: 10-year-old boy, normal intelligence, visual problems of central origin, including lack of voluntary control of the movements of the eyes and also impaired visual perception; moderate hearing loss, speech characterized by distortions and omissions of sounds, mild cerebral palsy and history of seizures.

Neurological Examination

I saw R--- for neurological evaluation because of difficulty with vision and hearing, clumsiness, unintelligible speech and problems in education.

He was first of his parent's three children. His siblings are all healthy.

Pregnancy was apparently unremarkable, but at birth R--- was apneac for about 20 minutes, and had repeated convulsions for about two days. He had been born after a suspected 10 month pregnancy, and his birth weight was 5 pounds and 2 ounces. He was cyanotic during the first 48 hours. Lumbar punctures on two occasions at birth are said to have yielded xanthrochromic spinal fluid. R--- walked at about a year. At age 2 he had about three seizures about every 2 months for over a 6 month period. These seizures lasted an hour or two and affected his right side predominantly with some post-ictal paralysis. These did not recur until five months ago, when he had a single seizure. He is presently on anticonvulsant medication. His speech is slow and difficult to understand. His vision has been impaired and he seems to have difficulty focusing on things and it is noticed that his left eye turns out. He is left handed; the only other left hander in either parents' family is the patient's mother's brother.

R--- is currently in a one-room school near his farm-home. He is a slow reader. He has to use large (24 point) type, which he can apparently see with either eye. There is no history of any operation, or any head injury, or illness with loss of consciousness except for the seizures previously mentioned. Currently he weighs 67 pounds and has a very good appetite.

Neurological examination revealed a pleasant and cooperative boy, whose speech was very dysarthric, and difficult to understand. The head circumference was 20 inches, a value about the 20th percentile. He was able to see a 3 millimeter white pill on a white sheet using both eyes. The left eye was noted frequently to turn out and down, but sometimes he would fix with the left eye, and on that occasion the right eye would turn out and slightly up. The fundi were normal. The confrontation visual fields were very difficult to perform. The patient tended, I think, to neglect objects in the right visual field, but he could not be gotten to understand the test. It was difficult to get him to concentrate his vision on the examiner. He did not at any point report perceiving that both of the examiner's hands were moving. The range of ocular movement seemed restricted, especially on upward gaze. Nystagmus was seen on conjugate internal gaze bilaterally. The jaw jerk was increased. I found no snout reflex. His expression was limited, although he did smile normally on several occasions. He seems to hear a tuning fork bilaterally, but not a watch tick. Choric movements of the protruded tongue were seen and similar movements were noted in the extended limbs. These were not weak, however. Tone was slightly increased to manipulation. As he walked, the arm swing was diminished and he walked with a slightly shuffling gait which seemed somewhat clumsy. The deep tendon reflexes were all hyperactive, with the exception of the ankle jerks which were slightly hypoactive. The plantar responses were flexor. He perceived the pinprick on face and all limbs. Double simultaneous stimulation was normal for symmetrical stimuli, but he consistently failed to report the more caudal of a pair of stimuli when they were applied asymmetrically. This abnormality is called face dominance. No lateral abnormality was noticed in this test. He was able to recognize objects placed in his hand. He identified several in a fashion which suggested that he was neglecting part of the figure, thus with either eye he identified a 2 as a 7, and a similar mistake which he made was to identify a 3 as a 5. Again he repeated this mistake with both eyes. He seemed to have a great deal of trouble focusing on whatever he was looking at or whatever the examiner wished him to look at. As he dressed after the examination, I noted that he put the sock on with the heel on top of his ankle, and he picked up the wrong boot and tried it on before recognizing his error, and finally put it on the correct foot. The visual disorder suggests that there may be some predominant parietal-occipital involvement in this child's cerebral damage. Presumably this damage was due to birth trauma, but the information available does not exclude other etiologies.

Excerpts from Psychological Report

There are strong indications that, aside from reduced visual acuity, R--- has impaired visual perception, probably at the neurological level. His work on Object Assembly and his figure drawings reflect confusion of body parts and part-whole relationships. As yet, he has not developed a consistent body image. The above hypothesis was further supported by the boy's reproduction of the Bender Gestalt designs. Gross distortions included dissociation, reversals, and representation of dots as a solid line.

The boy's assets include a relaxed social manner and willingness to speak in spite of difficulty in making himself understood. He is not easily threatened by difficult items and is amenable to specific suggestions and instructions. One can infer relatively high self esteem and trust in others.

In summary, R--- is a youngster with visual and auditory disabilities who also manifests some difficulty in perceptual integration. Psychological evidence points to impairment at the neurological level. The present estimate of functioning within the educable mentally retarded range would be interpreted with caution, since the boy's educational opportunities have been meager. R--- should be exposed to an intensive program of language development and visual-motor training. It is believed that the boy would also benefit from speech therapy to correct the articulation errors and from occupational therapy to improve fine motor coordination. To continue this child's education in his present school environment would increase his educational retardation and could bring about a decrease of psychological health resulting from perception of inadequacy.

CASE HISTORY

Case #4: Four-year-old boy, blindness and deafness of central origin, no speech, functional retardation with possible emotional component. (Rubella)

Neurological Examination

I saw A--- for neurological evaluation because of defective vision and hearing and retarded development. This boy is the only child of his parents. The pregnancy was marked by a weight gain of about 47 pounds but the mother denied symptoms of toxemia. There was no bleeding during the pregnancy. He was born 17 days prematurely. His weight was 5 pounds and 11 ounces. At about the age of three months, his visual defect was noted and around age two years he was noted to have difficulty hearing. His smell is thought to be intact since he seems to smell vitamins and refuses some foods prior to tasting. He seems to be able to see light only. He walked holding on at about age twelve months and walked alone at about age two and a half years. He does not fall very often. He still uses no words but does make wailing noises. He does not chew his food and won't hold a cookie. He takes only liquid or strained foods. He does not seem to have any pain and seems happy. He has not developed handedness. His appetite is good, his current weight is about thirty-five pounds. He remains incontinent of bowel and bladder. His mother states "He can't do anything but walk."

On examination, he is small and blonde with deeply sunken small optic globes. His vision is estimated as adequate only for light perception. The loss of vision is considered to be of central origin, not ocular. His fields cannot be adequately tested. The right optic fundus was seen with a minus 3 lens. The disc was not atrophic and no definite abnormalities were made out. The left fundus could not be seen except for the red reflex. The pupils were equal and reacted slowly. There was a searching pendular nystagmus which was increased when the light was held before his eyes. The face presented the appearance of bilateral weakness but the jaw jerk was normal. He did not respond to loud sounds. He used no words but cried sometimes during the examination. No definite paralysis was noted although full normal strength was not demonstrated. The deep tendon reflexes were brisker in the lower extremities than in the upper and the plantars were extensor bilaterally, that on the left more abnormal. The hand posture was abnormal with hyperextension of the fingers at the metacarpal phalangeal joints. No definite abnormality of sensation was detected.

The clinical picture suggests damage to eye, ear and brain. The cause of this is not certain, but rubella in the first trimester may produce this picture. Detailed psychological testing aimed at determining how much of his impairment is related to defect of the special senses, and how much to cerebral disorder, seems definitely indicated.

CASE HISTORY

Case #5: Seven-year-old girl, blind, severe hearing loss, no speech, retarded, possible familial etiology. (RLF)

Neurological Examination

I saw A--- in neurological consultation for evaluation of the sequelae of prematurity, blindness and deafness. Her father is Rh positive, her mother Rh negative. The patient is the third child of these parents. All three children were born prematurely. The first died at three years, the second at three hours.

The patient was born after six and a half months pregnancy via breech delivery with a birth weight of two pounds, twelve and a quarter ounces. There is no history of illness during pregnancy, although the mother did have a "cold" at the time of birth. Mother gave no history of prenatal fever, rash, jaundice, intoxication, drug therapy, unconsciousness or toxemia. Immediately after birth, the child was transferred to a hospital 35 miles away, where her blood was exchanged twice because of jaundice from the Rh incompatibility. She was also found to have a huge cavity in her chest due to the fact that her lungs didn't expand at birth. At about age four and a half months, blindness was discovered and attributed to retrolental fibroplasia. She has seemed inattentive to sounds and her hearing does not seem normal, although it does seem likely that she can hear loud sounds. She has not developed any speech and her communication is very limited. She does not know her way around the house and learned to walk at about age 18 months. She has not been found to have any heart trouble. She does not play with blocks much. She undresses better than she dresses. Currently she weighs about 32 pounds.

Neurological examination revealed a child who enjoyed playing with a ball and threw it to be retrieved by someone else whenever it was given to her. She grunts but does not say any words. She huffs and puffs and jumps about and swings her arms and turns and rubs her left eye very frequently. The head circumference is 58 cm. The eyes are extremely sunken in their sockets and they are difficult to see because she struggles so strongly when the attempt is made. I was barely able to see the corneal areas bilaterally and was not able to test the pupillary reactions or see the fundi. She kept her eyes closed most of the time. The globes are very small. Facial movements are symmetrical and there was no definite facial weakness. She does not attend to loud sounds or tuning forks. There was no apparent pharyngeal weakness or paralysis. The clavicles were present. Her strength seems normal throughout. Extensor tone was slightly increased in the lower extremities and the lower extremity deep tendon reflexes were slightly hyperactive. There was marked plantar grasping when the plantar response was tested, with a final brief extensor movement. The upper extremity deep tendon reflexes were not obtained but she was struggling most of the time. No sensory abnormality was noted but light touch and pin prick only could be tested. No abnormality of the spine or birth mark was noted. She walked relatively well with a stable base and groped as she walked.

This picture is consistent with static nonprogressive brain damage in association with prematurity. The deafness may be in large measure due to cortical involvement. There seems little to do from the neurological standpoint at the present time. The cause for the prematurity seems to be familial.

CASE HISTORY

Case #6: Six-year-old girl, useful vision in one eye, questionable hearing loss, no speech, functional retardation, surgically corrected heart disease. (Rubella)

Neurological Examination

L--- was seen for neurological evaluation because of visual, auditory and mental defects related to maternal rubella. Several of her siblings had rubella at the same time as her mother. She was born one month early with a birth weight of four pounds, four ounces. She was sluggish and the ocular disease was noted immediately and was operated on at age two and a half on the right eye and age three years on the left eye. Congenital heart disease was noted at age two to three months and heart surgery was done at age eleven months. A patent ductus arteriosis was ligated. Deafness was noted much later and subsequent hearing tests have suggested that the hearing loss is severe. The mother has noted that she does not respond to sounds. She walked at age three years and sat alone first at about age one year. She has only recently begun to be trained for bowels and bladder and still has some accidents. She is underweight, currently weighing 33 pounds. She seems happy and free of pain. She uses the spoon in either hand. She has no speech and her ability to communicate is severely restricted. She does not dress herself but can get some of her clothes off. She will feed herself with a spoon and will eat cookies. She gouges her eyes a great deal.

On examination, the head circumference is 47 cm. She cried and struggled a great deal during the examination, and frequently gouged her eyes. At the end of the examination, in a hurry to leave the examining room, she did help her mother to get her dressed. The left cornea is opaque, both ocular globes seemed small and sunken. The right media are clear but the fundi and disc could not be seen. Pendular nystagmus was noted, a slow pupillary reaction was noted on the right eye. I believe that she was able to see a 4 mm. pill at about 4 inches, but at greater distances she did not seem to see it and would feel about on the desk and recognize it by touch. I noted no facial weakness. She did not seem to respond to either loud or quiet sounds. She did not use any words. Her tone and strength of limbs seemed normal and she handled the pill relatively normally once she found it. The deep tendon reflexes were symmetrical but the right plantar was extensor. The left plantar response was probably flexor. Her gait did not seem especially remarkable considering that her vision is severely impaired. Likewise, her coordination seemed normal. She seemed to respond to a light touch and to a pinprick on all limbs.

The clinical picture of involvement of vision, hearing, brain and heart is entirely consistent with intrauterine rubella infection. Prolonged psychological studies to determine how much of this impairment is related to the special sense defect and how much to cerebral impairment, are definitely indicated.

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METHODS OF EDUCATION

Annette B. Dinsmore

In the fall of 1957, the American Foundation for the Blind initiated a pilot project for the diagnosis and evaluation of deaf-blind children, in cooperation with Syracuse University, at its Center for the Development of Blind Children.

Through referrals and requests for counseling in specific cases which the Foundation had been receiving in steadily increasing numbers, it had become evident that many of these problem deaf-blind children had disabilities over and above impairment of sight and hearing. Some of these children were functioning on a developmental level far below their chronological age. Some were failing to progress in school, while others appeared to need a special program to reach a goal of the greatest possible achievement. The Foundation felt that it was imperative to develop a body of knowledge through diagnosis and evaluation of as many of these children as time and money permitted, not only to make constructive recommendations for individual children, but to adapt techniques for tests and measurements and educational programs according to the combination of difficulties presented in each instance.

In 1932 the first formal department for deaf-blind children was established at Perkins School for the Blind, Watertown, Massachusetts. Nearly one hundred years before this, in 1837, Dr. Samuel Gridley Howe, director of Perkins, undertook to teach a little deaf-blind girl, Laura Bridgman, and proved it was possible to educate her. He developed communication with her by building up an understanding of words and sentences through raised letters and finger spelling. Laura's success, together with the spectacular achievements of Helen Keller who followed in her footsteps 50 years later, gave impetus to the education and training of other deaf-blind children during these early years. These children, scattered here and there throughout the country, made encouraging academic progress, some in schools for the deaf, and some in schools for the blind.

Helen Keller had the inestimable advantage of a great teacher, Anne Sullivan, who was also her constant companion--a teacher who poured language into her hand continuously through finger spelling so that Helen acquired knowledge of the world around her and the words with which to describe it as naturally as other children acquire such language through hearing. When Helen found out that a deaf-blind girl in Norway, Ragnhild Kaata, had been taught to speak, she was determined to learn this also. Arrangements were made for Helen to have lessons with Miss Sarah Fuller, principal of the Horace Mann School for the Deaf in Boston, who taught her to enunciate the elements of speech and to combine them into words and sentences. During that time Helen acquired the skill of reading the speech of others by touch, and thus a whole new means of communication was opened to her.

Methods used with the other deaf-blind children referred to above were based primarily upon methods used with deaf children generally. Although these students were given a great deal of individual instruction, it was not possible to give them sufficient repetition so that they could acquire language incidentally, as Helen did.

Records of deaf-blind persons registered with the American Foundation for the Blind in the middle 1940's show that a few people who were deaf-blind from infancy or early childhood had been successfully educated at the turn of the century--or in the first two decades of the 1900's. These were: Ada Marie Youmans of Indiana, born in 1876; Leslie Oren of Ohio, born 1893; Kathryne Frick of Pennsylvania, born 1901; Vera Gammon of Minnesota, born 1896; Ruby Miller of South Carolina, born 1906; and Helen Schultz of New Jersey, born 1904. A study of the archives of a southern school for the deaf reveals a number of additional deaf-blind children educated during this period and there is no doubt that similar records could be found in many other schools.

These persons all took their places competently as adults and we have no doubt that most of the others did also. We have no way of estimating how many other children may have tried and failed to learn, nor how many never have had a chance.

In the meantime, significant events were occurring. Miss Sophia Alcorn, a teacher trained in the oral education of the deaf, undertook to apply the method used in teaching Helen Keller to speak and to read lips tactually to the teaching of other deaf-blind children. Her first pupil was an eight-year-old deaf-blind girl, Oma Simpson, at the Kentucky School for the Deaf. Oma progressed rapidly during the 10 years of Miss Sophie's (as everyone called her) tutoring and learned excellent speech, language, and touch lip reading. Unfortunately, Oma died when she was still a young girl and probably never reached her highest potential. A few years later, Miss Sophie found another deaf-blind child, a boy of seven, in the South Dakota School for the Deaf. He was Winthrop Chapman, nicknamed "Tad," and he made even more spectacular progress than had Oma with Miss Sophie's teaching.

Miss Sophie used some special materials such as sandpaper letters which could be traced by touch, and diagrams of the position of the lips in forming vowels drawn with pipe stem cleaners. The most important adaptation of the method, however, was the exclusive use of touch or vibration speech reading to build vocabulary understanding and language. Speech also was taught through vibration and the children voiced words clearly and spoke with inflection and rhythm. Later on, Miss Sophie trained other teachers to work with Tad and turned her attention to applying the new technique in teaching deaf children. She named it "The Tadoma Method" after her two pupils, and although it was not widely adopted in the education of deaf children, it became the foundation for all subsequent oral teaching of deaf-blind children. Miss Inis Hall studied under Miss Sophie in South Dakota and became Tad's principal teacher from that time on. When he was admitted to Perkins in 1931, Miss Hall was requested to accompany him and direct the new special department for deaf-blind children there. Tad completed the full academic work of a standard high school course. He was graduated with a class of blind students, and then took his place with his family and friends as a contributing member of society.

As time went on and the need warranted it, other schools opened departments for deaf-blind children. These were: New York Institute for the Education of the Blind, 1937; California School for the Blind, 1945; Michigan School for the Blind, 1949; Iowa School for the Deaf, 1951; Washington School for the Blind, 1952; Alabama Institute for the Deaf and Blind, 1955; and Illinois Braille and Sightsaving School, 1957.

It was difficult for the schools to obtain qualified teachers and most of the training was given on an in-service basis, with courses in methods of teaching the deaf made available whenever possible. By the late 1940's, it was obvious that special teacher preparation courses must be offered to meet the teacher shortage in a growing population of deaf-blind children. Three six-week summer courses were sponsored by the American Foundation for the Blind and Perkins at the Horace H. Rackham School of Special Education, Ypsilanti, Michigan in 1949, 1950, and 1951. These proved inadequate since it was found that six weeks was too short a time to give prospective teachers even a basic foundation for this specialized field. The three summer sessions made no appreciable dent in the need for teachers. In 1953 the Iowa School for the Deaf initiated on-the-job training, affiliated with its established course for teachers of the deaf. This special training was on an undergraduate level and took three years. This had to be discontinued in 1957 because of staff changes, but the program had given definite impetus to the field.

In 1955, Perkins School for the Blind organized a one-year graduate course for teachers of deaf-blind children. Affiliated with Boston University (now with Boston College), the course offers credit toward a masters degree. The first class was enrolled in the fall of 1956 and the program was continued without interruption. As a result, Perkins has been able to expand its department considerably to help meet the need for educational opportunities, and to develop much needed research projects.

Most of the trainees have been absorbed into the Perkins program which expanded each year after the inception of the teacher preparation course. Only a few trickled into the mainstream of the departments throughout the country, and the schools administrating departments for deaf-blind children had to find teachers elsewhere and give training on the job, or reduce services. The Alabama Institute was able to expand its deaf-blind department by taking "teacher assistants" from the area and giving them in-service training. This department became the second largest in the country, taking pupils from out of state, primarily from the southeast region.

In the 1960's, under the impact of federal legislation for improved service for mentally retarded children, all phases of special education came under scrutiny and funds were made available for a variety of new programs. Through federal grants awarded to universities throughout the country, graduate preparation was offered for teachers of deaf children. In 1966, federal funds were allocated to universities offering training for teachers of deaf-blind children. As a result, two courses (in addition to the established one at Boston College) were started--one at San Francisco State College and the other at George Peabody College for Teachers in Nashville. Each was organized on a graduate level. At the same time, Michigan State University initiated a similar course on an undergraduate level and undertook to establish it without federal money. Only the years ahead can measure the efficacy of these new programs, but the trend looks encouraging.

Techniques of training and educating children with impaired sight and hearing, of necessity, have had to keep pace with those used with children having other handicaps. Forty years ago, very little use was made of residual hearing, while today every avenue of sound is utilized constantly through ever-improving means of amplification. Thus the child's environment takes on meaning, and in many instances hearing can be brought up to a level that would have seemed impossible a few years ago. We have also learned the value of sound to a child even though he may never be able to follow connected discourse.

The use of residual vision is equally essential and the child often requires direction and training in this area. Modern optical aids can be of real help in teaching the child to understand his visual environment. At the same time, he needs to learn skills employing his sense of touch, not only because he may experience further loss of vision, but also to add still another dimension to the world around him.

If a child can be identified early, even in infancy, as having defective sight and hearing, the preschool years can be made profitable ones for him and the margin of retardation due to the lack of communication can be narrowed considerably. If the mother can be given guidance in helping her child through successive developmental steps, the child will sit up, walk, eat solid food, learn toileting, and the like, at an age appreciably nearer to the age at which an ordinary child does these things. If the mother can show her child how to explore his environment and see it through touch, if she can help him to relate to other people and play with children, then she will have given him a basic preparation for school. Resources in the community such as nursery classes, can sometimes be of great help, and parent counseling can be offered by various types of professional workers--case workers, public health nurses, occupational and physical therapists, and teachers of kindergarten and nursery school classes.

The American Foundation for the Blind has published a pamphlet for parents of deaf-blind children, and Perkins School for the Blind has printed a manual offering more detailed suggestions. It has been stated that in our world of manpower shortage, too few professional workers of all kinds are available and our only reliable resource for these multiply handicapped children is the parent--and the only resource that offers a one-to-one relationship. It is of the utmost importance, therefore, to furnish as much guidance and counseling as possible.

The young deaf-blind child learns initially, as all children do, through imitation. The fundamental principles of teaching have not changed, although approaches to an individual child must be adapted to his special needs. In addition, since modern medical practices have kept children alive who would not have survived a few decades ago, many deaf-blind children today present more complex problems than formerly. Thus there are new and greater challenges to the educators. Often additional physical defects appear, and there may be overtones of emotional disturbance. The teacher must understand the significance of all these factors, and create a favorable climate for learning. She must first develop rapport with the child and watch closely for signs of inner language.

When the teacher recognizes that the child has such unexpressed concepts, she will be able to break through the barrier of no communication, reach the mind and personality of the child, and develop a plan for teaching.

The handling of materials of all kinds for sensory training can afford the child an endless variety of the same simple task--matching for size, shape, texture, color, sequence, function, and the like, giving repetition without seeming to do so by changing materials presenting the same problem. The teacher must have definite purpose in mind for each activity, such as concepts of numbers, "big-little," "hard-soft," "up-down," "rough-smooth," and similar contrasts. Imitation of gross and small movements can lead to repetition from memory of the sequence of movements or placing of materials. Every effort should be made to keep the spirit of play throughout the exercises. At the same time the teacher must watch for signs of challenges, thinking, and learning on the part of the child. She must be aware of his limit of tolerance, and change activities accordingly. Some children seem to need the security of exact repetition for a long time--use of the same materials again and again before replacing them. In such instances, too much variation can be confusing, but the goal should be kept in mind, namely to teach the child to use new and different materials based on his previous lessons. If knives, forks, and spoons are to be matched, sorted, or placed in sequence, use regular utensils first and later toy-sized ones. In the same way, take actual dishes familiar through experiences in the dining room and later sets of doll dishes. Articles of furniture can also be utilized for comparison in developing language concepts. Clothing can furnish a rich variety for matching or sorting, and parts of the body can be identified by touch--the child's nose, teacher's nose, another child's nose. In this way the body image grows and the child develops a recognition of the immediate environment.

One of the greatest resources for sense-training materials is the five-and-ten cent store. When the child can see colors, they can be used very effectively. The teacher should gradually increase the complexity of this phase of the training as far and as fast as the child's progress indicates.

Concurrently, the beginning of language understanding through speech reading should be started. The first step is to show the child that the teacher and other familiar people in his environment talk and sing by moving the lips and jaw and producing voice sounds which vibrate in the face and throat. The Tadoma Method of speech reading by touch, more commonly known as the "Vibration Method," has proved successful with deaf-blind children through the years. Nevertheless, occasionally a child is unable to use this method because of some emotional or neurological block. In such instances, finger spelling may be tried, exposing him to words and sentences in a similar pattern of presentation.

When the child shows some interest in what is happening when his teacher talks, and a willingness to put his hands on her face, he should be shown how to place his fingers most effectively, using both hands at first with the thumbs on the lips to catch lip movements and breath sounds and the fingers spread out to catch nasal vibrations and movements of the jaw and back of the tongue. At the same time he begins to absorb the feel of the rhythm, pitch, and quality of speech. The teacher should start with high interest words, action or objects as the case may be, being careful to put the words into complete sentences even though the child will recognize only the key word. For example, "Let's both jump now," "Will you jump down from the chair," "I will jump too." Again, variety should be used, and the child should not be kept jumping for weeks, months, even years on end. (This has actually been observed.) He can learn the language of everyday routine in the classroom, dining room, bathroom, playground, and so on, and once he has learned to understand certain words or directions, it is important to hold him responsible for what he knows, using as much repetition as possible.

Vibration speech reading, combined with training in the use of residual sight or residual hearing, can help to focus the child's attention on the spoken words. Children started in this way can sometimes develop sufficient auditory or visual skills to discontinue use of vibration speech reading, although it must be kept in mind that vibration helps the quality of the child's own voice production and inflection. The use of vibration speech reading with a child who has usable hearing for speech comprehension has been questioned as perhaps conditioning him against ever using that hearing. There is, however, little evidence for this theory and most of the facts appear to refute it. It must be kept in mind, in any circumstance, that sight or hearing must be utilized to the maximum. A few words of warning seem appropriate here. In all phases of educating the deaf-blind child, the teacher must be entirely objective in judging progress, and not read into behavior a knowledge that does not exist and which is only the result of coincidentally producing the requested response. Another danger is to give "hints." Of necessity the teacher first shows the child what to do and how to do it, at the same time giving him the vibration speech reading. Such demonstration usually must be repeated many times until the child begins to comprehend the fact of communication. In the teacher's concern that her pupil make the correct response, it is easy for her to show him what to do, through an unintentional gesture or touch when he should be understanding through vibration speech reading alone. Such a circumstance shows that he understands the signal but gives no clue to whether he recognizes the spoken word.

Language presented through finger spelling or through reading of print or braille should also be expressed in whole sentences as far as possible. If the child seems confused, single words can be used, but this is second choice. In beginning reading, familiar things in the environment can be labeled and matched as in a "sense training" exercise. Later whole sentences in print or braille can be given, such as "Put the book on the table," "Bring me the pencil from my desk," "Put the bowl on the window sill," "Open the box," "Wash your hands," "Pretend to fall down," "Pretend to go to sleep," "Show me the ---," "Where is the ---?"

Thus, the child's understanding of the language of his environment and that of experiences past, present, and future, should always far exceed his own command of vocabulary. He can get something out of recognizing key words in a book or dramatizing simple stories long before he can follow whole sentences and paragraphs. Again, if he can see pictures, these can add interest and meaning as they do for any child. Outline drawings in raised lines for those children who are blind may be of some interest, although the effectiveness of such raised line drawings are questioned even for a blind child with hearing and it is even more uncertain how meaningful these are to a child who cannot be given verbal explanations.

Books should become a part of every child's life and the deaf-blind child is no exception. If he needs the medium of braille he can recognize with pride his own braille book containing words that he knows even though pictures are not included. He may also have a looseleaf book to which words can be added as he learns them. Either could live in the book case beside other more complicated literature.

Some teachers have found it helpful to have the child form sentences by placing brailled words in sequence in wall or desk Plymouth charts. Here is an excellent opportunity to change tenses, pronouns, and names when indicated. This closely parallels the changing of similar words on a blackboard. It can be peculiarly effective if two children are working together on comparatively the same language level. If there is no opportunity for a competitive classmate, the teacher can pretend to be one herself so that the important changing can be made in given sentences for pronouns, names, tenses, etc.

Constructing sentences in this way is often necessary before the child can start learning to write braille, since writing braille is difficult and bears no obvious relationship to the configurations of the braille characters. During the time that language is beginning to unfold for the child, the teacher is giving him the basic preparation for the pronunciation of the words he is acquiring. Through imitation he is encouraged to use his voice in babbling exercises in much the way a young baby plays with sounds when he wakes up in the morning. Accurate positions of the organs of speech are worked for, and when a clear element is learned the child is given the written or brailled character for it. This helps to fix the sound in mind and to combine it with other sounds as he learns them. Once in a while the opposite approach is necessary, giving the child the whole word first and then breaking it down into separate speech elements.

Although a less formal approach to the teaching of speech can be used, particularly when the child can learn through auditory stimuli, most educators recognize the value of giving the child a sound basic knowledge of the elements of speech in order for him to feel secure and confident in his ability to make himself understood through oral communication. Understandable speech is invaluable to any deaf person and even more so to a deaf-blind individual.

In teaching the positions and movements of the organs of speech to a child who cannot watch the teacher nor check himself through a mirror to imitate her, it is necessary to let him "see" with his fingers. Tongue gymnastics can be fun for the child, sometimes using a lollipop which he can follow with the tip of his tongue to the right corner of the mouth, left corner, upper lip, and points between. Similarly, he can touch parts of the teeth, gums, and palate. Narrowing and widening of the tongue as well as specific positions of the tongue in giving sounds such as t, s, ee and others, need to be shown him through touch. A set of dentures with an artificial flexible tongue can give a clear demonstration of the proper positions and is effective for some children. Miss Alcorn's use of drawings representing the aperture of the lips in making vowels is helpful to deaf children with sight. For blind children, pipe cleaners can be used to create the same diagrams.

The child must be shown how to tie elements of speech together to create syllables, and syllables together leading to the formation of words and phrases. These elements of speech can be incorporated into his own book with a feeling of real satisfaction, and he can learn to pick elements he knows out of printed or brailled words in other books.

The teacher of the deaf or deaf-blind child waits for spontaneous speech from her pupil with an eagerness as great as a mother shows listening for her baby to say his first word. Words and sentences spoken by the child to try to convey a meaning to the teacher must be encouraged at all costs. Correction of his speech must never be made at this time in order not to discourage his interest in expressing himself. Needed correction should be noted and taken up at a regular speech lesson when such correction is the order of the day. One of the things he must understand is the difference between an initial and final consonant, the final consonant becoming an initial one if tied to a following word starting with a vowel.

An understanding of language gives the child not only a basis for communication, but also a foundation for the acquisition of knowledge through academic subjects. Methods of teaching language must be adapted to the individual child and must be kept flexible. The Fitzgerald Key with its classification of words, and indicated sequence of them in sentences, can be of great help to some children; while the Buell-Grodt less structured method of language development may better meet the needs of others. Rachel Daws Davies' technique of teaching reading represents still another means of vocabulary building, and there are others.

When the deaf-blind student develops some skill in academic subjects. . . , History, Geography, Mathematics and the like, he may profit by attending regular classes in the department for blind children. This is practical only if a teacher or teacher's aide is available to accompany him in order to interpret the class discussion. Finger spelling is the most practical for such interpretation since use of vibration speech reading would be disturbing to the rest of the class. Even the Tellatouch machine creates enough noise to be distracting. The deaf-blind student must continue to report to his special teacher for preparation of lessons and for maintenance of speech quality and high language levels. The special teacher can often ward off serious confusion by correcting minor misunderstandings.

As the deaf-blind student, skilled in vibration speech reading, approaches adulthood, he must learn additional methods of communication appropriate to the circumstances of his life ahead. He must understand the necessity for this. There are times when it is perhaps socially unacceptable to place the hand on the speaker's face, and the deaf-blind person should make the necessary adjustment accordingly. There are times when the deaf-blind person needs silent interpretation of a sermon, lecture, or activities around him. A few years ago a deaf-blind young lady, who could read lips perfectly through vibration, missed all the speeches and activities at a banquet celebration because she was unable to use finger spelling, the alphabet glove, printing in the palm, or even the Tellatouch. These and other methods can be used inconspicuously and make it possible for a deaf-blind person to have an interpreter who can relay to him everything that is being said and everything that is happening around him so that he can actually participate with others in a given experience.

For the outstanding deaf-blind student who is eligible for college training, several means of communication are essential. It is equally important in an employment situation for a deaf-blind worker to understand others by one or more methods in addition to vibration speech reading. In each instance skill in the use of several methods enables the deaf-blind person to meet a variety of people in daily contacts, relate to them constructively, and adjust to changes in approaches made to him. Nevertheless, it must be kept in mind that a deaf-blind person who is fortunate enough to have gained skill in vibration speech reading should keep it up as much as possible in order not to lose this ease of communication and to keep his own high quality of voice.

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APPENDIX

CENTER FOR THE DEVELOPMENT OF BLIND CHILDREN

805 South Crouse Avenue
Syracuse 10, New York

The following background material is necessary for the study and evaluation of a child:

1. Source and Date of Referral:
   To include each agency and/or school of which you are aware.
2. Family:
   Composition, status, and history.
3. Home Conditions:
4. Attitudes of Parents:
5. Medical Information:
   Birth history (date of birth, weight, etc.)
   Records of all hospitalizations.
   Doctors' and nurses' notations, if possible.
   Admission records.
   Tenure records: diagnosis, treatment, therapy, recommendations for follow-up.
   Discharge records.
   Description of other defects--handicaps.
6. Eye Information:
   Medical and functional.
7. Hearing Information:
   Medical, audiological, and functional.
8. Neurological Data:
   Tests: dates, findings, by whom, etc.
9. Child:
   Development descriptions--physical, social, emotional, activities.
10. Services:
    Description of inter and intra-agency services.
    Focus of Services.

11. Education:
    Progress reports, etc.

12. Summary of Case:
    Reasons for referral to Syracuse Center.
    Workers' statement of problems.

13. Description and List of Available Services in Community, County, etc., for follow-up:

CENTER FOR THE DEVELOPMENT OF BLIND CHILDREN
AT SYRACUSE UNIVERSITY

805 South Crouse Avenue
Syracuse, New York

The Center for the Development of Blind Children at Syracuse University provides a diagnostic service for visually handicapped children.

The diagnostic staff includes a pediatrician, an ophthalmologist, a pediatric neurologist, an otologist, a speech and hearing consultant, a psychologist, and other consultants from the area of special education. Additional medical consultants available for special referrals include a child psychiatrist, a pediatric cardiologist, and an orthopedist.

With the exception of medical examinations requiring laboratory facilities, all examinations and observations are carried out in the informal atmosphere of playrooms in the Special Education Building at the University.

Each child must be referred to the Center by a physician, school, or case-work agency. In each case the child's physician should be advised of the diagnostic procedure in advance.

It is requested that all physicians' reports and copies of previous psychological, educational, neurological, and hearing evaluations be sent to the Center in advance, along with a case summary and family history. Medical records should also be obtained from the hospital where the child was born. Parents should bring with them any available baby books and other records pertaining to the child's infancy which may aid in making the developmental history as complete as possible.

Since the Center cannot provide follow-up services to families to help them utilize facilities in their home communities, it is important that the referring agency send a worker who can be here during the four-day study period and who can participate in the staff conference. The staff confers with the parents throughout the study and at the conclusion of the visit to the Center. The parents and agency worker may ask for additional conferences as they wish.

During the four-day period the child and his parents have appointments at well-spaced intervals which allow some free time during the day in order to prevent over-fatigue.

It is important that the study be made as smooth as possible for the child and his parents. The following suggestions have proved helpful:

1. Bring the child's favorite toy.

2. Dress the child in old, comfortable clothes.

3. Bring the child's own eating utensils. If traveling by car, it would be advisable to bring his high chair, potty chair, etc.

4. Bring materials for the child to occupy himself with during free periods in the hotel or during waiting periods.

5. Bring books, knitting, cards, etc., for your own evening free time.

6. Keep as much as possible to the child's usual routines--eating, sleeping, toileting, play, etc.

7. Plan to stay with the child at all times, unless otherwise requested. He will be reassured to know that his parents are with him.

8. Even though the child may seem to be too young to understand, it is wise to reassure him that you will be with him most of the time and that you will always be in the same building.